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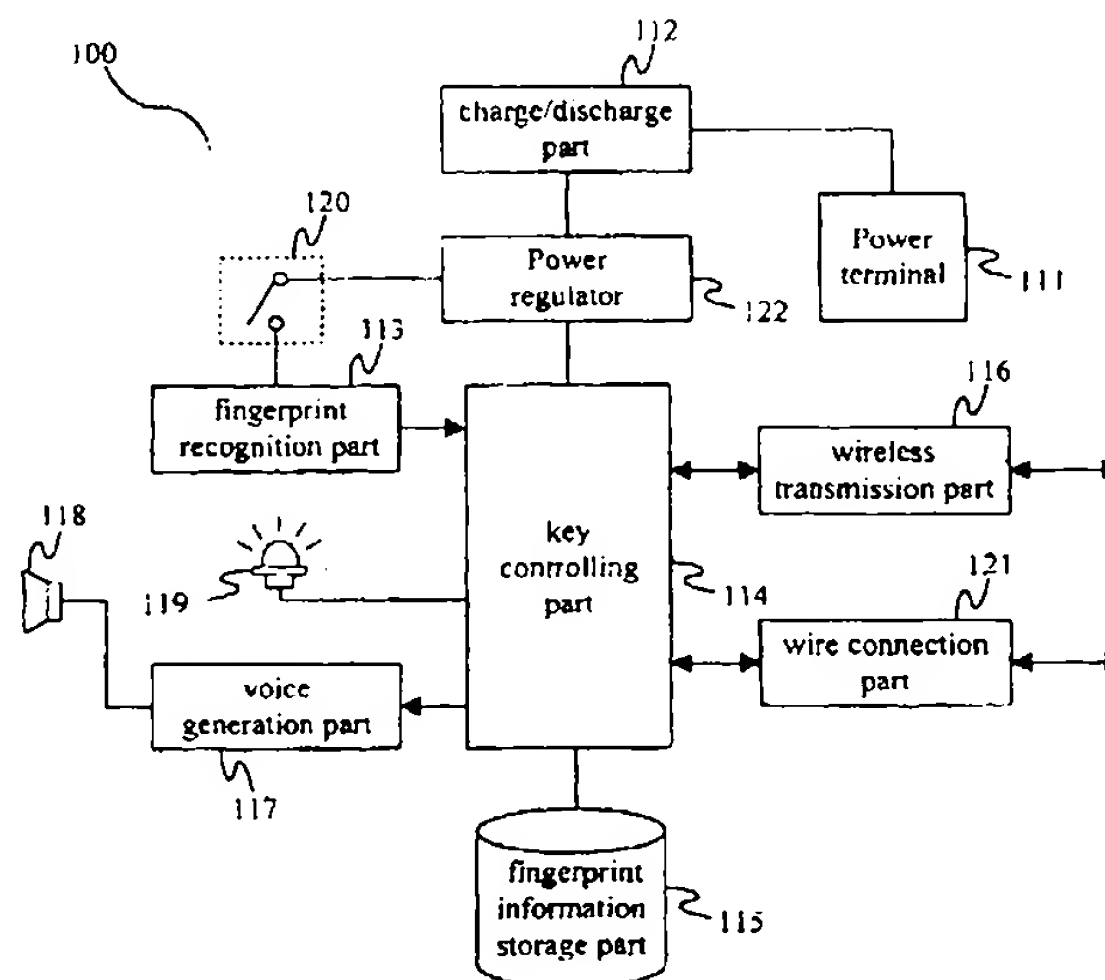
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(54) Title: FINGERPRINT RECOGNITION KEY, LOCK, AND CONTROL METHOD



(57) Abstract: A fingerprint recognition key capable of recognizing fingerprint information, driven by a rechargeable power source as well as a power supply is provided. Also provided is a fingerprint recognition key using a mobile communication terminal and a battery installed therein. A lock device capable of locking/unlocking a door or starting a vehicle using the above key, and a method for controlling such device are also provided. Since the fingerprint recognition key comprises a charging circuit, it can be supplied with power while it is connected to a lock device. The fingerprint recognition key is embodied as a start key of a vehicle in an embodiment, while it is embodied as a mobile communication terminal having a fingerprint recognition processor installed in its battery in another embodiment.

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## FINGERPRINT RECOGNITION KEY, LOCK, AND CONTROL METHOD

### Technical Field of the Invention

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The present invention relates generally to a fingerprint recognition key, lock, and control method therefor, and, in particular, to a fingerprint recognition key capable of recognizing fingerprint information, driven by a rechargeable power source as well as a power supply; a fingerprint recognition key using a mobile communication terminal and a battery installed therein; a lock device capable of locking/unlocking a door or starting a vehicle using the above key; and a method for controlling such device.

### Background of the Invention

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A door lock of recent days is designed so complicated and solidly that unlocking thereof without a key is almost impossible. In addition, the keys for locking and unlocking a door lock are also designed so complicated and diversely that unlocking of a door lock by an inappropriate key is almost impossible.

20 However, a problem with mechanical keys is that the level of security provided by such keys is very low, since they can easily be copied.

Furthermore, if a plural of doors shall be controlled as it is the case in a hotel or an intelligent building, administration of the keys is not easy, because different doors require different keys. For instance, when an administrator or a staff of a hotel has to look for different rooms, he or she must carry all the keys for these rooms. Alternatively, an ID card

for storing user information, such as personal identification card, is used for better security. However, this ID card fails to control admission of an unauthorized person, once an authentication is given to the authorized user. This ID card is likely to be misused as well when it is borrowed and used by a third person.

5           In order to overcome these problems with a door lock device, devices are being developed in recent days utilizing passwords or technology in recognizing physical information of a user, such as voice recognition, fingerprint recognition, iris recognition, etc.

          For example, a conventional door lock device using fingerprint information  
10   comprises a user authentication element for identifying a fingerprint of a user and a door lock element to be installed at a door. Such a conventional lock device comprises a fingerprint recognition sensor for sensing the fingerprint of a person at the outside of the door, a fingerprint storing means for a fingerprint pattern after the pattern recognized by the fingerprint sensor has been encoded, a door lock control means for control of the door  
15   lock based on the comparison between the sensed fingerprint pattern and the stored patterns, and a door lock driver for performing the lock/unlock operation in accordance with the door lock control means.

          However, a conventional door lock equipped with a fingerprint recognition sensor is incapable of authenticating a user without prior registration of the fingerprint  
20   information of that user, and, even when an authorized user with registered fingerprint information allows a third person to enter, this third person cannot enter the door without company of the registered user. In addition, fingerprint information for authentication of a user is likely to be leaked to an unauthorized third person with such conventional door locks, since they are exposed outdoors. Further problems with such a conventional device

is that the fingerprint recognition sensor is easily soiled and/or damaged due to its external exposure, and that a fingerprint image once used for authentication of a user can be copied and then used unduly further.

New techniques have been developed to overcome the above problems, wherein  
5 the fingerprint information recognized by a fingerprint recognition key is wirelessly transmitted to a door. However, another problem arose here, since the fingerprint recognition key were designed to operate with batteries or rechargeable batteries such as mercury batteries, that the door could not be locked/unlocked until the fingerprint recognition key was supplied anew with power by substituting or recharging the batteries,  
10 once the power of the batteries has been discharged.

### Detailed Description of the Invention

15 The present invention, conceived in view of the above problems, aims to provide a fingerprint recognition key capable of locking/unlocking a door by means of fingerprint recognition, and is charged and driven by power applied to a door, or the like.

The present invention aims further to provide a lock device capable of locking/unlocking by transmitting, by wire or wireless, fingerprint information as  
20 recognized by a fingerprint recognition key which is driven by a rechargeable power source, and a method for control of the device.

It is another objective of the present invention to provide a fingerprint recognition key capable of starting a vehicle, a motorcycle, or the like, by fingerprint information as recognized by a fingerprint recognition key, which is recharged and driven by a power



source applied to the starting device of the vehicle, the motorcycle, or the like.

Another objective of the present invention is to provide a lock device capable of starting a vehicle, a motorcycle, or the like by transmitting, by wire or wireless, fingerprint information as recognized by a fingerprint recognition key which is driven by a rechargeable power source, and a method for control of the device.

Another objective of the present invention is to provide a fingerprint recognition device by adding a fingerprint recognition function to the battery of a wireless mobile communication terminal to enable the mobile communication terminal to lock/unlock a door, whereby substantially enhancing the usability of the mobile communication terminal.

Still another objective of the present invention is to provide a method for locking/unlocking a door using a fingerprint recognition device capable of encoding fingerprint information utilizing random numbers generated at each locking/unlocking of the door by a mobile communication terminal with additional function of recognizing fingerprints and by a battery installed thereto.

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### Brief Description of the Drawings

Fig. 1 illustrates configuration of an embodiment of a fingerprint recognition key to be driven by a rechargeable power and a power supply in accordance with the present invention.

Fig. 2a is a front view of an embodiment of a fingerprint recognition key to be driven by a rechargeable power and a power supply in accordance with the present invention.

Fig. 2b is a rear view of an embodiment of a fingerprint recognition key to be driven by a rechargeable power and a power supply in accordance with the present invention.

Fig. 3 illustrates configuration of an embodiment of a lock device in accordance with the present invention, using a fingerprint recognition key as in Fig. 1.

Fig. 4a is a side sectional view of a lock device in accordance with the present invention as in Fig. 3.

Fig. 4b is a front view of a lock device in accordance with the present invention as in Fig. 3.

Fig. 5 illustrates configuration of another embodiment of a lock device in accordance with the present invention, using a fingerprint recognition key as in Fig. 1.

Fig. 6 is a flowchart of a method for unlocking/locking a door, using a fingerprint recognition key in accordance with the present invention, as in Fig. 1.

Fig. 7 is a detail flowchart for the step of transmitting code information for registration or additional registration in Fig. 6.

Fig. 8 is a detail flowchart for the step of transmitting code information for single ignorance of fingerprint for a deputy user in Fig. 6.

Fig. 9 is a detail flow chart for the step of transmitting a code information for locking a door in Fig. 6.

Fig. 10 is a detail flow chart for the step of transmitting code information for unlocking a door in Fig. 6.

Fig. 11 is a detail flow chart for the step of transmitting code information for initialization the registration information by the door in Fig. 6.

Fig. 12 is a detail flowchart for the step of registering or additional registering by

the door in fig. 6.

Fig. 13 is a detail flowchart for the step of ignoring single fingerprint for a deputy user in Fig. 6.

Fig. 14 is a detail flowchart for the step of door locking in Fig. 6.

5 Fig. 15 is a detail flowchart for the step of door unlocking in Fig. 6.

Fig. 16 is a detailed flowchart for the step of initializing the registration information by the door in Fig. 6.

Fig. 17 is a detail flowchart of a method for turning on/turning off a vehicle engine using a fingerprint recognition key in accordance with the present invention as in Fig. 1.

10 Fig. 18 is a detail flowchart for the step of starting a vehicle in Fig. 5.

Fig. 19 illustrates configuration of a fingerprint recognition device using a mobile communication terminal and the battery installed therein in accordance with an embodiment of the present invention.

Figs. 20a and 20b are front views of the battery as in Fig. 19.

15 Fig. 21 illustrates configuration of a door lock control device in accordance with the present invention.

Fig 22 is a flowchart of the method for generating and transmitting a random number by a door to a fingerprint recognition device in accordance with an embodiment of the present invention.

20 Fig 23 is a flowchart of the method for generating and transmitting a random number by a door to a fingerprint recognition device in accordance with another embodiment of the present invention.

Fig. 24 is a flowchart of embodiment of the method for administering the random numbers generated in Fig. 22 or Fig. 23.

Fig. 25 is a flowchart of an embodiment of the method for encoding the transmitted information by a fingerprint recognition device in accordance with the present invention.

Fig. 26 illustrates configuration of a fingerprint recognition device using a mobile  
5 communication terminal and the battery installed therein in accordance with another embodiment of the present invention.

### Description of the Preferred Embodiments

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The preferred embodiments of the present invention are described below in detail, making reference to the appended drawings.

Fig. 1 illustrates configuration of an embodiment of a fingerprint recognition key to be driven by a rechargeable power and a power supply in accordance with the present  
15 invention.

Referring to Fig. 1, a fingerprint recognition key as per the present invention comprises a power charge/discharge part 112 which is recharged by a power source applied to by a power source terminal 111; a fingerprint recognition part 113 for recognition of a user's fingerprint; a key control part 114, which controls registration and erase of a  
20 fingerprint inputted by the fingerprint recognition part 113, and provides fingerprint codes information and control codes information upon request of a door or a vehicle; a fingerprint information storing part 115, which stores the fingerprint codes information from the key control part 114; a wireless transceiver part 116, which receives a wireless request signal from the door or the vehicle and transmits the same to the key control part

114, and then, transmits the fingerprint information received from the key control part 114 to the door or to the starting device of the vehicle after having transformed the same into a wireless signal; a voice generation part 117, which generates a voice signal corresponding to a signal indicating the current process of the fingerprint recognition key 100 as it is provided by the key control part 114; a speaker 118 capable of releasing a theft prevention alarm by control of the key control part 114, or of outputting a voice signal as regenerated by the voice generation part 117; a lamp 119 capable of generating light for a theft prevention alarm by control of the key control part 114, or of indicating by light the current process of the fingerprint recognition key 100; a switch 120, which applies power supplied from the power charge/discharge part 112 to the fingerprint recognition part 113 when it is switched on by push on the fingerprint recognition part 112; a wire connection part 121, which receives a signal transmitted by wire from the door or the vehicle and connects the same to the key control part 114, and connects the fingerprint information transmitted from the key control part 114 to the door or to the starting device of the vehicle; and a power regulator 122, which stabilizes power supplied by the power charge/discharge part 112

Further, a fingerprint recognition key 100 having the above configuration, comprises a plural of buttons exposed on its exterior for input of a user's instructions.

The power terminal 111 supplies power from the door or the starting device of the vehicle to the charge/discharge part 112 when the fingerprint recognition key is inserted in the door or in the starting device of the vehicle.

The charge/discharge part 112 supplies power to the fingerprint recognition key 100 after it has been charged by power applied from the door or the starting device of the vehicle via the power terminal 111, and applies power inputted via the power terminal 111



to the fingerprint recognition key 100 to drive the same.

The fingerprint recognition part 113, being a part consuming relatively high power, shall not be supplied with power during carriage by maintaining the switch 120 off, so that unnecessary consumption of power in the charge/discharge 112 is prevented. Namely, if a  
5 user presses the fingerprint recognition part 113 in order to use the fingerprint recognition key 100, the switch is turned on by pressure of the fingerprint recognition part 113, and power from the charge/discharge part 112 is applied to the fingerprint recognition key 100. To enable the switch 120 thus function in accordance with the manipulation of the fingerprint recognition part 113, the switch 120 is located adjacent to the fingerprint  
10 recognition part 113, inside the fingerprint recognition key 100.

The above control part 114, using the fingerprint image information sensed by the fingerprint recognition part 113, extracts the minutiae of the fingerprints, such as ridges, valleys, ending points, bifurcation points, short ridges (or islands), enclosures (or lakes), cross over, etc. of a fingerprint, identifies the fingerprints, generates a peculiar binary code  
15 (fingerprint code) for each fingerprint, and then, stores the same in the fingerprint information storage part 115. Here, the key control part 114 may be an eight or sixteen bytes microprocessor equipped with a counter (or clock), an interrupter, a serial or a parallel port, etc., comprising an operation system and a small volume memory such as a ROM for storing the basic driving program and a RAM.

20 The technique of extracting fingerprint images and identifying a fingerprint, being a technique widely used currently, has been disclosed inter alia by USP 6,041,133. Further, the technique of analyzing the ridge-vector of a fingerprint after scanning of the fingerprint image and producing a unique code therefor has been disclosed in USP 6,002,787 (Fingerprint analyzing and encoding system).

The fingerprint information storage part 115, which can be embodied in flash memory, RAM, or the like, stores the fingerprint code of the users supplied by the key control part 114 in the order of their registration.

5 The wireless transceiver part 116 transmits the fingerprint information and the control information outputted by the key control part 114 to the door or the starting device of the vehicle after having converted them into wireless signals, and transmits the wireless information transmission request signal received from the door or the starting device of the vehicle to the key control part 114 after having converted them into base band signals.

10 The speaker 118, which outputs order of the key control part 117 in voice as regenerated by the voice generation part 117, notifies a user the current process of the fingerprint recognition key 100 in voice. The key control part 114 outputs predetermined orders for operation of the fingerprint recognition key 100 to the voice generation part 117, i.e. the key control part 114 outputs predetermined operation orders corresponding to the process of usage of the fingerprint recognition key 100, as the various buttons attached to  
15 the outside of the fingerprint recognition key 100 are manipulated.

Here, if an unauthorized person manipulates the fingerprint recognition key 100 as described above, the key control part 114 releases a predetermined warning sound through the speaker 118, whereupon the voice generation part 117 transmits the warning sound outputted by the key control part 114 to the speaker without processing.

20 The lamp 119, which generates light under control of the key control part 114, indicates the current process of the fingerprint recognition key 100 in the course of use of the key by a user, or warns of the danger of theft. If a third person whose fingerprint is not stored in the fingerprint information storage part 115, attempts, without authorization, to unlock the door or to start the vehicle using the fingerprint recognition key 100, the key

control part 114 detects it and warns that the person is not authorized, by lighting the lamp 119. Further, the fingerprint recognition key 100 can comprise a plural of lamps 119 capable of generating different colors for the purpose of indicating various stages of the process of usage of the fingerprint recognition key 100 in different colors.

5           The fingerprint recognition key 100 as per the present invention can also be embodied in a PDA, a mobile communication terminal, etc.

Fig. 2a is a front view of a fingerprint recognition key in accordance with the present invention having a configuration as in Fig. 1.

As illustrated in Fig. 2a, the fingerprint recognition key 100 in accordance with the  
10   present invention comprises on its front side, buttons 211 through 216 for manipulation of the fingerprint recognition key 100, an earth terminal 217, connection terminals 218 through 221 constituting a wire connection part 121 for connection to a door or a vehicle, a slide cover 222, a hanger 223 for hanging the fingerprint recognition key 100 on a wall and the like, fixation latches 224, 225 for preventing slide out of the fingerprint recognition key  
15   100 while it is inserted in a door or a vehicle, a power terminal for connection to the power terminal of a door or a vehicle, and a fingerprint recognition part 113.

Fig. 2b is a rear view of a fingerprint recognition key in accordance with the present invention, having a configuration as in Fig. 1.

As illustrated in Fig. 2b, the fingerprint recognition key in accordance with the  
20   present invention comprises on its rear side, a speaker 118, a lamp 119, and a cover 226 for covering the fingerprint recognition key 100.

Further, a lock device for locking/unlocking a door in accordance with the present invention using a fingerprint recognition key as per the present invention, comprises a fingerprint recognition key 100 and a door lock/unlock control device 300, as shown in Fig.

3.

As shown in Fig. 3, a door lock/unlock device 300 in accordance with the present invention comprises a power charge part 311 for charging the charge/discharge part 112 of the fingerprint recognition key 100 using power supplied from an external power source 301, a power terminal 312 for connection to the power terminal of the fingerprint recognition key 100 in order to allow the charging power supplied from the power charging part 311 to be applied to the charge/discharge part 112, a key insertion sensor part 313 for sensing insertion of the fingerprint recognition key 100, a lock/unlock control part 314 for controlling locking/unlocking of the door based on the fingerprint code information and the control code information provided by wire or wireless from the fingerprint recognition key 100 while insertion of the fingerprint recognition key 100 is sensed by the key insertion sensor part 313, a lock/unlock information storage part 315 for storing the fingerprint code information received by wire or wireless from the fingerprint recognition key 100 as provided by the lock/unlock control part 314, a door lock/unlock driver part 316 for locking/unlocking the door by control of the lock/unlock control part 314, a wireless transceiver part 317, which transmits information transmission request signals from the lock/unlock control part 314 to the fingerprint recognition key 100 after having converted the same into wireless signals, and transmits the wireless fingerprint code information and control code information received from the fingerprint recognition key 100 to the lock/unlock control part 314 after having converted them into base band signals, a voice generation part 318 for generation in voice of the signals relating to the current process of the door lock/unlock control device 300 as provided by the lock/unlock control part 314, a speaker 319 which releases a warning sound by control of the lock/unlock control part 314 or outputs voice signal as regenerated by the voice generation part 318, a lamp 320, which

generates light by control of the lock/unlock control part 314 for prevention of a theft or indicates by light current process of the door lock/unlock device 300, a wire connection part 321, which connects by wire the information transmission request signals from the lock/unlock control part 314 to the fingerprint recognition key 100 and further connects the  
5 fingerprint code information and the control code information inputted by wire from the fingerprint recognition key 100 to the lock/unlock control part 314, and a power regulator 322, which stabilizes power applied from the external power source 301 to the door lock/unlock control device 300.

The door lock/unlock control device 300 having the above configuration is  
10 equipped with an initialization button (not shown in the drawing) in an exposed manner to enable inputting of a user's initialization order. Upon push of the initialization button, the lock/unlock control part 314 erases all fingerprint code information stored in the lock/unlock information storage part 315 and initializes the lock/unlock information storage part 315.

15 The key insertion sensor part 313 senses insertion of a fingerprint recognition key 100 into the door lock/unlock control device 300 and transmits the result to the lock/unlock control part 314.

If the key insertion sensor 313 senses insertion of a fingerprint recognition key, the lock/unlock part 314 requests the key control part 114 of the fingerprint recognition key  
20 100 to transmit information, receives fingerprint code information and control code information from the key control part 114 in response to the request, and then controls the door lock/unlock control part 316. Here, the lock/unlock control part 314 confirms whether the fingerprint code information provided by the key control part 114 coincides with the fingerprint code information stored in the lock/unlock, and controls the door lock/unlock



driver to unlock the door in case of the coincidence. Since the control code information includes a door unlock order or a lock order, the lock/unlock control part 314 determines an unlock order or a lock order of the key control part 114 via the control code information.

The door lock/unlock driving part 316, being a mechanical element capable of  
5 locking/unlocking the door under control of the lock/unlock control part 314, comprises one or more relays and solenoids, but not limited thereto.

The speaker 319, which outputs order of the lock/unlock control part 314 in voice as generated by the voice generation part 318, notifies a user the current process of the door lock/unlock control device 300 in voice. The lock/unlock control part 314 outputs  
10 predetermined orders for operation of the door lock/unlock control device 300 to the voice generation part 318, i.e. the lock/unlock control part 314 outputs predetermined operation orders corresponding to the process of usage of the door lock/unlock control device 300 in accordance with manipulation of the above initialization button or manipulation in connection with the fingerprint recognition key 100. Here, if a fingerprint code information  
15 not stored in the lock/unlock information storage part 315 is received from the fingerprint recognition key 100, the lock/unlock control part 314 releases a predetermined warning sound through the speaker 318, whereupon the voice generation part 318 transmits the warning sound outputted by the lock/unlock control part 314 to the speaker without processing.

20 The lamp 320, which generates light under control of the lock/unlock control part 314, indicates the current process by manipulation of the door lock/unlock control device 300 or by manipulation in connection with the fingerprint recognition key 100, or warns of the danger of a theft as described above. Further, the door lock/unlock control device 300 can comprise a plural of lamps 320 capable of generating different colors for the purpose

of indicating various stages of the process of usage of the door lock/unlock control device 300 in different colors.

The key insertion part of the door lock/unlock control device 300 for insertion of a fingerprint recognition key 100 may be embodied as in Figs. 4a and 4b, but not limited to  
5 such figures, allowing various embodiments by different manufacturer.

The key fixation part 411, 412 in Figs. 4a and 4b for fixing fixation latch 224, 225 of the fingerprint recognition key 100 is embodied with a spring, an elastic body, etc., to allow a user to insert a fingerprint recognition key into the door lock/unlock control device 300 with a certain force and to draw the fingerprint recognition key 100 from the door  
10 lock/unlock control device 300 with a certain force when the fingerprint recognition key 100 is fixed by the key fixation part 411, 412.

Fig. 5 illustrates configuration of another embodiment of a lock device in accordance with the present invention, using a fingerprint recognition key as in Fig. 1, consisting of a fingerprint recognition key 100 and a starting device 500 for vehicle.

15 As shown in Fig. 5, a vehicle starting control device 500 in accordance with the present invention comprises a power charge part 511 for charging the charge/discharge part 112 of the fingerprint recognition key 100 using the power supplied from an external power source 501, a power terminal 512 for connection to the power terminal of the fingerprint recognition key 100 in order to allow charging power supplied from the power  
20 charging part 511 to be applied to the charge/discharge part 112, a key insertion and location sensor part 513 for sensing insertion as well as location of the fingerprint recognition key 100, a start control part 514 for controlling start of the vehicle based on the fingerprint code information and the control code information provided by wire or wireless from the fingerprint recognition key 100 while insertion of the fingerprint recognition key

100 and the location of the insertion are sensed by the key insertion and location sensor part 513, a start information storage part 515 for storing the fingerprint code information received by wire or wireless from the fingerprint recognition key 100 as provide by the start control part 514, a starting device driver part 516 for controlling start of the vehicle by  
5 control of the start control part 514, a wireless transceiver part 517, which transmits information transmission request signals from the start control part 514 to the fingerprint recognition key 100 after having converted the same into wireless signals, and transmits the wireless fingerprint code information and control code information received from the fingerprint recognition key 100 to the start control part 514 after having converted them  
10 into base band signals, a voice generation part 518 for generation in voice of the signals relating to the current process of the start control device 500 as provided by the start control part 514, a speaker 519 which releases a warning sound by control of the start control part 514 or outputs the voice signal as regenerated by the voice generation part 518, a lamp 520 which generates light by control of the start control part 514 for prevention of a  
15 theft or indicates by light the current process of the vehicle start control device 500, a wire connection part 521, which connects by wire the information transmission request signals from the start control part 514 to the fingerprint recognition key 100 and further connects the fingerprint code information and the control code information inputted by wire from the fingerprint recognition key 100 to the start control part 514, and a power regulator 522,  
20 which stabilizes power applied from the external power source 501 to the vehicle start control device 500.

The above vehicle start control device 500 is equipped with an initialization button (not shown in the drawing) in an exposed manner to enable inputting of a user's initialization order. Upon push of the initialization button from outside, the start control

part 514 erases all fingerprint code information stored in the lock/unlock information storage part 315 and initializes the start information storage part 515.

The key insertion and location sensor part 513 senses insertion of a fingerprint recognition key 100 into the start control device 500 and transmits the result to the start control part 514, and further senses whether the inserted fingerprint recognition key 100 is located on start "on" or start "off" position and transmits the result to the start control part 514.

If the key insertion and location sensor 513 senses insertion of a fingerprint recognition key 100 and locates it on start "on" position, the start control part 514 requests the key control part 114 of the fingerprint recognition key 100 to transmit information, receives fingerprint code information and control code information from the key control part 114 in response to the request, and then controls the start control part 516. Here, the start control part 514 confirms whether the fingerprint code information provided by the key control part 114 coincides with the fingerprint code information stored in the start information storage part 515, and controls the start device driver 516 to start the vehicle in case of coincidence. Since the control code information includes a start on order or a start off order, the start control part 514 determines a start on order or a start off order of the key control part 114 via the control code information.

The starting device driving part 516, being a mechanical element capable of starting the vehicle under control of the start control part 514, comprises one or more relays and solenoids, but not limited thereto.

The speaker 519, which outputs order of the start control part 514 in voice as regenerated by the voice generation part 518, notifies a user the current process of the start control device 500 in voice. The start control part 514 outputs predetermined orders for

operation of the start control device 500 to the voice generation part 518, i.e. the start control part 514 outputs predetermined operation orders corresponding to the process of usage of the start control device 500 in accordance with manipulation of the above initialization button or manipulation in connection with the fingerprint recognition key 100.

5 Here, if a fingerprint code information not stored in the start information storage part 515 is received from the fingerprint recognition key 100, the start control part 514 releases a predetermined warning sound through the speaker 519, whereupon the voice generation part 518 transmits the warning sound outputted by the start control part 514 to the speaker without processing.

10 The lamp 520, which generates light under control of the start control part 514, indicates the current operation process by manipulation of the start control device 500 or by manipulation in connection with the fingerprint recognition key 100, or warns of the danger of a theft as described above. Further, the start control device 500 can comprise a plural of lamps 520 capable of generating different colors for the purpose of indicating  
15 various stages of the process of usage of the start control device 500 in different colors.

The key insertion part of the start control device 500 for insertion of a fingerprint recognition key 100 may be embodied as in Figs. 4a and 4b, but not limited to such figures, allowing various embodiments by different manufacturer.

The start control device 500 also comprises key fixation parts for fixing fixation  
20 latch 224, 225 of the fingerprint recognition key 100 as the above door lock/unlock control device 300, to be embodied as springs, elastic bodies, etc

Furthermore, the key insertion part of the start control device 500 is so designed that turning of the fingerprint recognition key 100 between start on and start off position is possible while the fixation latches 224, 225 of the fingerprint recognition key 100 are fixed



by the above key fixing parts.

However, although exchange of the information between the fingerprint recognition key 100 and the door lock/unlock control device 300 or the vehicle start control device 500 is performed using wireless signals in the above description, the present invention is not limited thereto, but rather can also be embodied using optical waves, ultra short waves, ultrasonic waves, etc.

Moreover, additional functions of controlling auxiliary devices of a vehicle may be added to the fingerprint recognition key 100 as well, so that, e.g. locking/unlocking of the trunk, on/off of seat light or tail lights are controlled by the fingerprint recognition key.

The data frame exchanged between the fingerprint recognition key 100 and door lock/unlock device 300 or the vehicle start control device 500 is consisted of in a manner stated in Table 1 below:

Table 1

STX	Control Code	User Fingerprint Code	Additional Information Code	ETX
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In Table 1, STX represents a frame initiating code, while ETX represents a frame ending code.

The control code is a code indicating locking/unlocking of a door, initiating start of a vehicle, etc., and the additional information code is a code for unique number of a fingerprint recognition key 100, a unique number of a door, user information, etc.

The personal information of users and the information exchanged with the fingerprint recognition key 100 are stored in each of the lock/unlock information storage part 315 and start information storage part 515 described above.

The process of locking/unlocking a door using a fingerprint recognition key 100 of the present invention having the above configuration and function is described in detail making reference to Fig. 6.

As shown in Fig. 6, the fingerprint recognition key 100 determines whether any  
5 button attached thereto has been pushed (601) in stand-by status, and maintains the stand-by status in the absence of a button push.

Upon push of the registration button, the fingerprint recognition key 100 receives fingerprint information of a user inputted, generates a registration code as well as a user fingerprint code and transmits them to the door lock/unlock control device 300 by wire or  
10 wireless (602). Subsequently, the door lock/unlock control device 300 registers anew or additionally the inputted user fingerprint code as a new user based on the registration request as per the registration code (603).

Upon push of the single fingerprint ignore button, the fingerprint recognition key 100 receives fingerprint information of a user inputted, generates a single fingerprint  
15 ignore code as well as a user fingerprint code, and transmits them to the door lock/unlock control device 300 by wire or wireless (604). Subsequently, the door lock/unlock control device 300 ignores the user authentication process based on the single fingerprint ignore code and completes the locking/unlocking operation of the door, and then it resets the user authentication process ignore setting (605).

20 Upon push of the door lock button, the fingerprint recognition key 100 receives fingerprint information of a user, generates a (door) lock code as well as a user fingerprint code and transmits them to the door lock/unlock control device 300 by wire or wireless (606). Subsequently, the door lock/unlock control device 300 locks the unlocked door based on the lock request as per the lock code (607).

Upon push of the door unlock button, the fingerprint recognition key 100 receives fingerprint information of a user, generates a (door) unlock code as well as a user fingerprint code and transmits them to the door lock/unlock control device 300 by wire or wireless (608). Subsequently, the door lock/unlock control device 300 unlocks the locked  
5 door based on the unlock request as per the unlock code (609).

Upon push of the initialization button, the fingerprint recognition key 100 receives fingerprint information of a user, generates an initialization code as well as a user fingerprint code and transmits them to the door lock/unlock control device 300 by wire or wireless (610). Subsequently, the door lock/unlock control device 300 erases all  
10 information registered at the lock/unlock information storage part 315 based on the initialization request as per the initialization code (611).

Fig. 7, being a detail flowchart for the step of transmitting code information for registration or additional registration in Fig. 6, shows transmission process of code information required for a new or additional registration by the door from a fingerprint  
15 recognition key 100 to a door lock/unlock device 300.

As shown in Fig. 7, upon push of the registration button of the fingerprint recognition key 110 by a user for registration or additional registration of a fingerprint code (701), the key control part 114 confirms whether a user fingerprint information has been inputted within a predetermined time limit (702). If no fingerprint information has  
20 been inputted, the key control part 114 terminates the registration or additional registration process.

If the fingerprint information has been inputted, the key control part 114 generates a registration code, a user fingerprint code in respect to the inputted user fingerprint information, and transmits them by wire or wireless to the door lock/unlock control device

300 (703).

Then, the key control part 114 confirms whether a fingerprint input request code of a registered user has been received (704), and terminates the registration or additional registration process if no such code has been received.

5       The request by the door lock/unlock control device 300 for input of fingerprint code of a user registered in the lock/unlock information storage part 315 aims to confirm whether the registered user has allowed registration or additional registration of the inputted user fingerprint code. The door lock/unlock control device 300 requests to input fingerprint code of a registered user via the speaker 319 or the lamp 320 as well.  
10       Accordingly, the registered user inputs his fingerprint via the fingerprint recognition part 113.

If a request for fingerprint input has been received in the course of the above confirmation process (704), the key control part 114 receives fingerprint information of the registered user, generates a fingerprint code of the registered user, and then transmits them  
15       by wire or wireless to the door lock/unlock control device 300 (706).

Fig. 8, being a detail flowchart for the step of transmitting code information for single ignorance of fingerprint for a deputy user in Fig. 6, shows the process of transmitting code information required for locking/unlocking a door or starting a vehicle by a deputy user from the fingerprint recognition key 100 to the door lock/unlock control  
20       device 300.

As shown in Fig. 8, upon push of the single fingerprint ignore button on the fingerprint recognition key 100 (801) to enable a user registered at the door lock/unlock control device 300 allow an unregistered deputy user to lock/unlock the door, the key control part 114 confirms whether user fingerprint information has been inputted within a

predetermined time limit (802). If no such user fingerprint information has entered, the key control part 114 terminates the single fingerprint ignore process.

If, however, user fingerprint information has entered, the key control part 114 generates a single fingerprint authentication ignore code, a user fingerprint code in respect  
5 to the inputted user fingerprint information, and stores them in the fingerprint storage part 115 (803).

Then, the key control part 114 confirms whether the unlock button of the fingerprint recognition key 100 has been pushed (804), and terminates locking/ unlocking of the door as per the user authentication ignore process if the unlock button was not  
10 pushed.

If, however, the unlock button was pushed, the key control part 114 generates a single fingerprint authentication ignore code, a user fingerprint code in respect to the inputted user fingerprint information, and stores them in the fingerprint storage part 115 (805).

15 After the single fingerprint authentication ignore code and user fingerprint code have been transmitted to the door lock/unlock control device 300 as described above, the key control part 114 erases the single fingerprint authentication ignore code and the user fingerprint code stored in the fingerprint information storage part 115 (806), which step aims to prevent locking/unlocking by an unregistered third person using the fingerprint  
20 recognition key 100.

Fig. 9, being a detail flow chart for the step of transmitting code information for locking of a door in Fig. 6, shows the process of transmitting the code information required for locking an unlocked door from the fingerprint recognition key 100 to the door lock/unlock control device 300.



As shown in Fig. 9, upon push of the lock button of the fingerprint recognition key 100 by a user for locking of an unlocked door (901), the key control part 114 confirms whether user fingerprint information has been inputted within a predetermined time limit (902). If no such user fingerprint information has been entered, the key control part 114  
5 maintains the door unlocked.

If, however, user fingerprint is confirmed to have been received in the course of the above confirmation process (902), the key control part 114 generates a lock code, a user fingerprint code for the inputted user fingerprint information, and transmits them by wire or wireless to the door lock/unlock control device 300 (903).

10 Fig. 10, being a detail flow chart for the step of transmitting code information for unlocking of a door in Fig. 6, shows the process of transmitting code information required for unlocking a locked door from the fingerprint recognition key 100 to the door lock/unlock control device 300.

As shown in Fig. 10, upon push of the unlock button of the fingerprint recognition  
15 key 100 by a user for unlocking of a locked door (1001), the key control part 114 confirms whether user fingerprint information has been inputted within a predetermined time limit (1002). If no such user fingerprint information has entered, the key control part 114 maintains the door locked.

If, however, user fingerprint information is confirmed to have been received in the  
20 course of the above confirmation process (1002), the key control part 114 generates an unlock code, a user fingerprint code in respect to the inputted user fingerprint information, and transmits them by wire or wireless to the door lock/unlock control device 300 (1003).

Fig. 11, being a detail flow chart for the step of transmitting code information for initialization of the registration information by the door in Fig. 6, shows the process of

transmitting code information required for initializing the registered information for locking/unlocking a door stored in the lock/unlock information storage part 315 from the fingerprint recognition key 100 to the door lock/unlock control device 300.

As shown in Fig. 11, upon push of the initialization button of the fingerprint  
5 recognition key 100 by a user for initializing the locking/unlocking information stored in the lock/unlock information storage part 315 of the door lock/unlock control device 300 (1101), the key control part 114 confirms whether user fingerprint information has been inputted within a predetermined time limit (1102). If no such user fingerprint information has been entered, the key control part 114 stops initializing the door lock/unlock control  
10 device 300.

If, however, user fingerprint information is confirmed to have entered in the course of the above confirmation process, the key control part 114 generates an initialization request code, a user fingerprint code in respect to the inputted user fingerprint information, and transmits them by wire or wireless to the door lock/unlock control device 300 (1103).

15 Then, the key control part 114 confirms whether a fingerprint input request code of a registered user has been received within a predetermined time limit from the door lock/unlock control device (1104), and stops initialization of the door lock/unlock control device 300 if no such code has been received.

The request by the door lock/unlock control device 300 for input of fingerprint  
20 code of a user registered in the lock/unlock information storage part 315 aims to confirm whether the initialization of lock/unlock information storage part 315 is performed by a registered user. The door lock/unlock control device 300 requests to input fingerprint code of a registered user via the speaker 319, or the lamp 320 as well.

If a request for fingerprint input has been received in the course of the above

confirmation process (1104), the key control part 114 receives fingerprint information of the registered user, generates a fingerprint code of the registered user (1105), and then transmits the fingerprint code of the registered user by wire or wireless to the door lock/unlock control device 300 (1106).

5           Fig. 12, being a detail flowchart for the step of registering or additional registering by the door in Fig. 6, shows the process of receiving a user fingerprint code by the door lock/unlock control device 300 from the fingerprint recognition key 100 through a process as in Fig. 7, and of registering or additionally registering a user.

          As shown in Fig. 12, the door lock/unlock control device 300 confirms whether  
10   the code information has entered from the fingerprint recognition key 100 (1201), and maintains stand-by status until input of the code information if no such information has been inputted.

          If, however, code information has entered, it is confirmed whether the code  
information is a registration code (1202). If no registration code has been inputted, the  
15   registration or additional registration process stops.

          If the entered code information is a registration code, the lock/unlock control part 314 searches the lock/unlock information storage part 315 to confirm whether one or more fingerprints of the user are registered (1203). In case one or more fingerprints are registered, the lock/unlock control part 314 confirms whether any of the registered  
20   fingerprint codes stored in the lock/unlock information storage part 315 coincides with the fingerprint code inputted through the fingerprint recognition part 113 (1204), and notifies user the existence of registered identical fingerprint code via the speaker 319 or the lamp 320 (1205).

          If it is confirmed in the course of the above confirmation process (1204) that no

coinciding information is existent, the lock/unlock control part 314 requests the user to input a registered fingerprint of the user in order to confirm whether the person, whose fingerprint has currently been inputted is an authorized new user via the speaker 319 or the lamp 320, and transmits the fingerprint input request code by wire or wireless to the  
5 fingerprint recognition key 100 (1206).

Then, the lock/unlock control part 314 confirms whether a registered fingerprint of the user has been inputted within a predetermined time limit in response to the above request (1207), passes to the step of notifying via the speaker 319 or the lamp 320 that the requested fingerprint code has not been inputted (1205).

10 If it is confirmed in the course of the above confirmation process (1207) that the requested fingerprint code has been inputted, the lock/unlock control part 314 confirms whether one or more fingerprint codes registered in the lock/unlock information storage part 315 coincide with the inputted fingerprint code (1208). If no fingerprint code is confirmed to coincide, the lock/unlock control part 314 passes to the step of notifying via  
15 the speaker 319 or the lamp 320 that the user fingerprint code desired to be additionally registered cannot be registered (1205).

If a fingerprint code is confirmed to coincide, the lock/unlock control part 314 additionally registers the fingerprint code desired to be registered in the lock/unlock information storage part 315 (1209).

20 If, however, it is not confirmed in the course of the above confirmation process 1203 that one or more fingerprint codes have been registered, the lock/unlock control part 314 proceeds to newly register the fingerprint code in the lock/unlock information storage part 315 (1210).

Fig. 13, being a detail flowchart for the step of single ignoring of the fingerprint

for a deputy user in Fig. 6, shows the process of receiving by the door lock/unlock control device 300 of single fingerprint ignore code from the fingerprint recognition key 100 in a process as in Fig. 8, and then erasing the single fingerprint after locking/unlocking of the door by a deputy user.

5           As shown in Fig. 13, the door lock/unlock control device 300 confirms whether the code information has entered from the fingerprint recognition key 100 (1301), and maintains stand-by status until input of the code information if no such information has been inputted.

10           If, however, code information has entered, it is confirmed whether the code information is a single fingerprint ignore code (1302). If no single fingerprint ignore code has been inputted, locking/unlocking process by the deputy user stops.

15           If the entered code information is single fingerprint ignore code, the lock/unlock control part 314 confirms whether one or more fingerprints of the user registered in the lock/unlock information storage part coincide with the fingerprint inputted through the fingerprint recognition part 113 (1303). If no coinciding fingerprint code exists, a notification is released via the speaker 319 or the lamp 320 (1205) notifying that the door cannot be locked/unlocked by the deputy user due to the lack of a coinciding fingerprint code.

20           If a fingerprint code is confirmed to coincide, the lock/unlock control part 514 unlocks the door and ignores user fingerprint authentication procedure for a predetermined time period (1305).

          Then, the lock/unlock control part 314 confirms whether a predetermined time period has elapsed after setting of the user authentication ignore process (1306), and maintains the user authentication ignore setting if the predetermined time period has not



elapsed.

After the above predetermined time period has elapsed in the course of the above confirmation process (1305), the user authentication ignore setting is either automatically cancelled, or maintained until the user authentication mode change button is pushed (1307).

5        Fig. 14, being a detail flowchart for the step of door locking in Fig. 6, shows the process of locking an unlocked door by the door lock/unlock control device 300 after receiving a door lock code from the fingerprint recognition key 100 through a procedure in Fig. 9.

As shown in Fig. 14, the door lock/unlock control device 300 confirms whether  
10       the code information has been entered from the fingerprint recognition key 100 (1401), and maintains stand-by status until input of the code information if no such information has been inputted.

If, however, code information has entered, it is confirmed whether the code information is a door lock code (1402). If no lock code has been inputted, the locking  
15       process stops and the door is maintained unlocked.

If the entered code information is a lock code, the lock/unlock control part 314 confirms whether one or more fingerprints registered in the lock/unlock information storage part 315 coincide with the fingerprint inputted through the fingerprint recognition part 113 (1403). If a fingerprint code is confirmed to coincide, the lock/unlock control part  
20       514 locks the door by driving the door lock/unlock driver 316 (1404), and outputs the result via the speaker 319 or the lamp 320 (1405).

If no coinciding fingerprint code exists after the above confirmation (1403), the door lock/unlock control device 300 proceeds to the step of notifying via the speaker 319 or the lamp 320 that the door cannot be locked due to the lack of a coinciding fingerprint

code (1405).

Fig. 15, being a detail flowchart for the step of door unlocking in Fig. 6, shows the process of unlocking a locked door by the door lock/unlock control device 300 after receiving a door unlock code from the fingerprint recognition key 100 through a procedure  
5 in Fig. 10.

As shown in Fig. 15, the door lock/unlock control device 300 confirms whether the code information has been entered from the fingerprint recognition key 100 (1501), and maintains stand-by status until input of the code information if no such information has been inputted.

10 If, however, code information has entered, it is confirmed whether the code information is a door unlock code (1502). If no unlock code has been inputted, the unlocking process stops and the door is maintained locked.

If the entered code information is an unlock code, the lock/unlock control part 314 confirms whether one or more fingerprints registered in the lock/unlock information  
15 storage part 315 coincide with the fingerprint inputted (1503). If a fingerprint code is confirmed to coincide, the lock/unlock control part 514 unlocks the door by driving the door lock/unlock driving part 316 (1504), and outputs the result via the speaker 319 or the lamp 320 (1505).

If no coinciding fingerprint code exists after the above confirmation (1503), the  
20 door lock/unlock control device 300 proceeds to the step of notifying via the speaker 319 or the lamp 320 that the door cannot be unlocked due to the lack of a coinciding fingerprint code (1505).

Fig. 16, being a detailed flowchart for the step of initializing the registration information by the door in Fig. 6, shows the process of initializing the information

registered at the lock/unlock information storage part 315 by the door lock/unlock control device 300 after receiving an initialization request code from the fingerprint recognition key 100 through a procedure in Fig. 11.

As shown in Fig. 16, the door lock/unlock control device 300 confirms whether  
5 code information has entered from the fingerprint recognition key 100 (1601), and maintains stand-by status until input of the code information if no such information has been inputted.

If, however, the code information has entered, it is confirmed whether the code  
information is an initialization request code (1602). If no initialization request code has  
10 been inputted, the process of initializing the information registered at the lock/unlock information storage part 315 of the door lock/unlock control device 300 stops.

If the entered code information is an initialization request code, the lock/unlock control part 314 confirms whether one or more fingerprints registered in the lock/unlock information storage part 315 coincide with the fingerprint inputted through the fingerprint  
15 recognition part 113 (1603). If no coinciding fingerprint code exists, the door lock/unlock control part 314 notifies via the speaker 319 or the lamp 320 that initialization of the lock/unlock information storage part 315 is not possible to the lack of a coinciding fingerprint code (1604).

If, however, one or more fingerprint codes are confirmed to coincide, the  
20 lock/unlock control part 314 notifies the user via the speaker 319 or the lamp 320 thereof (1605), requests the user to input a registered user fingerprint via the speaker 319 or the lamp 320 in order to confirm if the person who has currently inputted his fingerprint is authorized as a new user, and then transmits by wire or wireless a fingerprint input request code to the fingerprint recognition key 100 (1606).

Then, the lock/unlock control device 300 confirms whether a registered user fingerprint has been inputted within a predetermined time limit in response to the above request (1607), and proceeds to the step of notifying that no such fingerprint has been inputted (1604) in case of non-entrance thereof.

5           If, however, it is confirmed in the course of the above confirmation process (1607) that requested fingerprint code has entered, the lock/unlock control part 314 confirms whether one or more fingerprints registered in the lock/unlock information storage part 315 coincide with the fingerprint inputted (1608). If no coinciding fingerprint code exists, the door lock/unlock control part 314 notifies via the speaker 319 or the lamp 320 that  
10   initialization of the lock/unlock information storage part 315 is not possible due to the lack of a coinciding fingerprint code (1604).

If, however, any coinciding fingerprint code exists, the lock/unlock control part 314 erases all information stored in the lock/unlock information storage part 315 (1609), and notifies the user via the speaker 319 or the lamp 320 thereof (1610).

15           Fig. 17, being a detail flowchart of a method for start on/start off a vehicle engine using a fingerprint recognition key in accordance with the present invention as in Fig. 1, shows the process of transmitting, by wire or wireless, the code information required for starting a vehicle from the fingerprint recognition key 100 to the start control device 500.

As shown in Fig. 17, the fingerprint recognition key 100 confirms whether a code  
20   requesting transmission of a user fingerprint information has been received from the start control device 500 (1702), while maintaining stand-by status for start on/off of the vehicle (1701), and maintains the stand-by status until such transmission request code is inputted if no such request has been received. In such a case, the start control part 514 requests to input a fingerprint via the speaker 519 or the lamp 520, whereupon the user inputs his

fingerprint.

If, however, a user fingerprint transmission request code has been received, the fingerprint recognition key 100 receives the user fingerprint via the fingerprint recognition part 113 (1703).

5       After a user fingerprint has entered as described above, the key control part 114 confirms whether the inputted user fingerprint is properly scanned (1704), notifies via the speaker 118 or the lamp 119 that the scanning was inappropriate in case of an inappropriate scanning (1705), and maintains stand-by status.

10       If it is confirmed in the course of the above confirmation procedure (1704) that the fingerprint was properly scanned, a start initiating code and a fingerprint code in respect to the inputted user fingerprint code are generated, and then transmitted to the vehicle start control device 500 (1706).

15       Subsequently, the key control part 114 confirms whether a start completion code notifying completion of the start action has been received from the vehicle start control device 500 (1707), and terminates transmission of the code information required for start of a vehicle in case such a code has been received.

If, however, it is confirmed in the course of the above confirmation procedure (1704) that no start completion code was received, the key control part 114 maintains stand-by status.

20       Fig. 18, being a detail flowchart for the step of starting a vehicle in Fig. 5, shows the process of starting a vehicle by the vehicle start control device 500 after having received code information relevant to the start of a vehicle from the fingerprint recognition key 100 through a procedure in Fig. 17.

As shown in Fig. 18, the start control part 514 confirms via the key insertion and



position sensor 513 whether the fingerprint recognition key 100 has been inserted in the key insertion part of the start device (1801).

The start control part 514 maintains start off status if no fingerprint recognition key 100 has been inserted, while it confirms whether the inserted fingerprint recognition  
5 key is located on start on position in case the fingerprint recognition key 100 has been inserted (1802).

The start control part 514 maintains stand-by status if the fingerprint recognition key 100 is not on the start on position. If, however, the fingerprint recognition key 100 is on the start on position, the start control part 514 requests the user via the speaker 519 or  
10 the lamp 520 to input his fingerprint and transmits, by wire or wireless, a user fingerprint transmission request asking to transmit the inputted user fingerprint to the fingerprint recognition key 100 (1803).

Subsequently, the start control part 514 confirms whether the inputted user fingerprint code has been received through the procedure as in Fig. 17 from the fingerprint  
15 recognition key 100 (1804), and proceeds to the step of transmission request (1803) if no such fingerprint code has been received.

If user fingerprint code has been received, the start control part 514 confirms whether a start initiating code has been received through the procedure as in Fig. 17 from the fingerprint recognition key 100 (1805), and proceeds, in case no coinciding fingerprint  
20 code exists, to the step of notifying via the speaker 519 or the lamp 520 that start of the vehicle is not possible due to non-coincidence between the inputted fingerprint code and the registered fingerprint codes (1806).

If, however, a coinciding fingerprint code exists, the start control part 514 starts the vehicle by driving the start driver 516 (1808).

The start control part 514 then confirms whether the vehicle has properly started (1809), and proceeds to the step of key insertion (1801) after having notified via the speaker 519 or the lamp 520 that the start was improper (1810) if the vehicle did not start properly.

5           If it is confirmed in the confirmation procedure (1809) that the vehicle has started properly, the start control part 514 generates a start completion code signifying a proper start of the vehicle, and transmits the same to the fingerprint recognition key 100 (1811).

In addition, other driving devices which requires engine starting like a motorcycle can also be started using a fingerprint recognition key 100 as per the present invention.

10

Fig. 19 illustrates configuration of a fingerprint recognition device using a mobile communication terminal and the battery installed therein in accordance with an embodiment of the present invention..

As shown in Fig. 19, the fingerprint recognition device in accordance with an  
15   embodiment of the present invention is consisted of a fingerprint recognition processor 1910, which registers/erases fingerprint information of a user upon his order, encodes the fingerprint code information inputted upon request of the door and the door lock/unlock control code information representing the user's order, and then provides the coded fingerprint code information; and a wire/wireless signal connection processor 1960, which  
20   transmits the signal received wireless from the door and the user order relating to registration/erase of fingerprint information to the fingerprint recognition processor 1910 and transmits the fingerprint code information as well as the coded information relative to the control code information to the door after having converted them into wireless signals.

Here, the fingerprint recognition processor 1910 is installed in the battery 1900 of the mobile communication terminal, while the wire/wireless signal connection processor 1960 is installed in the mobile communication terminal 1950.

The fingerprint recognition processor 1910 installed in the battery 1900 comprises  
5 a fingerprint recognition part 1911 for recognition of users' fingerprints; a key control part 1912 for controlling registration/erase of fingerprints inputted via the fingerprint recognition part 1911 in accordance with the order of a user as inputted through the mobile communication terminal 1950 and for providing the fingerprint code information as well as the control code information upon request of the door after having encoded them; a  
10 fingerprint information storage part 1913 for storing the fingerprint code information provided by the key control part 1912; a wireless transceiver part 1914, which transmits the wireless signals received from the door to the key control part 1912 and transmits the information transmitted from the key control part 1912 to the door after having converted them into wireless signals; a lamp 1915 for generating light for prevention of a theft or  
15 indicating by light the current process of the fingerprint recognition device in use by control of the key control part 1912; a switch 1916, which applies power to the fingerprint recognition part 1911 when it is switched by push on the fingerprint recognition part 1911 by a user; and a wire connection part 1917 which connects the signals transmitted by wire from the mobile communication terminal 1950 to the key control part 1912.

20 The battery 1900 equipped with a fingerprint recognition device as per the present invention, having the above configuration, comprises a charge/discharge part 1901 capable of supplying power to the fingerprint recognition processor 1910 and the mobile communication terminal 1950 after it has been charged by the power supplied from a power charger; a regulator 1902 for stabilizing power applied from the charge/discharge

part 1911 to the fingerprint recognition processor 1910; and the peripheral elements (not indicated in the drawing) for charge/discharge of the charge/discharge part 1901 as well as for power supply to the mobile communication terminal 1950.

Since the fingerprint recognition part 1911 consumes relatively high power, it is  
5 desirable that the switch 1916 remains off during carriage so that unnecessary consumption of power from the power charge/discharge part 1901 is prevented, in a manner that the switch 1916 is automatically turned on concurrently with a push on the fingerprint recognition part 1911, allowing application of power from the power charge/discharge part 1901 to the fingerprint recognition part 1911 when a user pushes the fingerprint  
10 recognition part 1911 for use of the fingerprint recognition device 1910. The switch 1916 is installed adjacent to the fingerprint recognition part 1911 inside of the fingerprint recognition device 1910 to enable switching of the switch 1916 by manipulation of the fingerprint recognition part 1911.

Since the above key control part 1912 operates almost in the same way as the key  
15 control part 114 in Fig. 1, an explanation thereof is omitted. However, the key control part 1912 performs an additional function to that of the key control part 114 by encoding the fingerprint information, controlling the information, the additional information, etc. to be transmitted to the door based on the random number provided to the door, and transmitting the encoded information to the door.

20 The fingerprint information storage part 1913 can be embodied by a flash memory, RAM, and the like, having a small memory capacity sufficient for storing several kbytes. The fingerprint information storage part 1913 stores user fingerprint code information as provided by the key control part 1912 in the sequence of their registration, and other information such as additional information (e.g. user personal information, etc.), user

fingerprint codes for single fingerprint ignore process, etc.

The wireless transceiver part 1914 exchanges information wireless between the fingerprint recognition device 1910 and the mobile communication terminal 1950 in case the battery 1900 is separated from the mobile communication terminal 1950.

5           When the door is locked/unlocked using the fingerprint recognition device 1910 while the battery 1900 is separated from the mobile communication terminal 1950, the wireless transceiver part 1914 converts the fingerprint code information and the control code information for lock/unlock of the door received from the key control part 1912 into wireless signals and transmits them to the door, while it converts the information  
10   transmission request signals received from the door into base bandwidth signals and transmits them to the key control part 1912.

Since the lamp 1915 operates almost in the same manner as the lamp 119 in Fig.1, an explanation thereof is omitted.

The wire connection part 1917 connects information in respect to the user order  
15   inputted by wire from the mobile communication terminal 1950 to the key control part 1912.

The wire connection part 1917 connects, further, the information transmission request signal provided wireless by the door to the key control part 1912 after having received the same by wire from the mobile communication terminal 1950. If the key  
20   control part 1912 provides, in response to the above information transmission request signal, fingerprint code information and control code information, etc. via the mobile communication terminal 1950 to the door, the fingerprint code information and the control code information, etc. are transmitted by wire through the wire connection part 1917 to the mobile communication terminal 1950, and then, transmitted to the door after having been



converted into wireless signals by the mobile communication terminal 1950.

For a data exchange through the mobile communication terminal 1950 as above, the battery 1900 and the mobile communication terminal 1950 can exchange data, either via a communication terminal or a cable connected to this terminal, or via a power terminal  
5 for application of power from the battery 1900 to the mobile communication terminal 1950.

Further, the wire/wireless signal connection processor 1960 to be attached to the mobile communication terminal 1950, comprises a main control part 1961, which transmits user order inputted from the keypad 1951 to the fingerprint recognition processor 1910, controls exchange of various information between the fingerprint recognition processor  
10 1910 and the door, and indicates the current process of the fingerprint recognition processor 1910 in use; a voice generation part 1962, which regenerates in voice the signals for current process of the fingerprint recognition processor 1910 as provided by the main control part 1961; a speaker 1963, which releases alarm sound for prevention of a theft by control of the main control part 1961 or outputs voice signal as regenerated by the voice  
15 generation part 1962; a wire connection part 1964, which connects signal received by wire from the fingerprint recognition processor 1910 to the main control part 1961, and connects signal received from the main control part 1961 to the fingerprint recognition processor 1910 by wire; and a wireless transceiver part 1965, which transmits the information provided from the fingerprint recognition processor 1910 to the door after  
20 having received and converted the same into wireless signal, and receives the wireless signal from the door to the fingerprint recognition processor 1910 to transmit the same to the main control part 1965.

The key pad 1951, being a key pad 1951 for manipulation of the ordinary function of a mobile communication terminal with added function of fingerprint recognition in

accordance with the present invention, is used for input of user orders for registration/erase of fingerprints, initialization of the registration information, etc. However, the present invention is not limited to manipulation via the key pad 1951, but rather covers manipulation of fingerprint recognition function via buttons installed separately, as well.

5           The mobile communication terminal 1950 displays via its LCD the contents relating to the current process of the fingerprint recognition processor as per the present invention in use as they are provided by the main control part 1961.

          The main control part 1961 receives various information provided from the key control part 1912 to the door as inputted by the wire connection part 1917, 1964 to transmit  
10   the same wireless to the door through the wireless transceiver part 1965, and receives signals transmitted wireless from the door such as the information transmit request signal through the wireless transceiver part 1965 to transmit the same further to the key control part 1912 through the wire connection part 1917, 1964. And then, the main control part 1961 transmits user orders inputted from the key pad 1951 such as that for  
15   registration/erase of a fingerprint, an order for initialization of registration information, etc. through the wire connection part 1917, 1964.

          In addition, the main control part 1961 can control wireless communication of the mobile communication terminal 1950 as well.

          The speaker 1963 which outputs in voice order of the main control part 1961 as  
20   regenerated by the voice generation part 1962 notifies in voice the current use process of the fingerprint recognition device in accordance with the present invention. Here, the main control part 1961 receives predetermined orders of the fingerprint recognition device 1910 for manipulation of the fingerprint recognition device as per the present invention inputted through the wire connection part 1964 to output the same to the voice generation part 1962,

i.e. the main control part 1961 outputs a predetermined manipulation order corresponding to each use process of the fingerprint recognition device based on the manipulation buttons attached at the exterior of the fingerprint recognition device as per the present invention.

If an unauthorized third person manipulates the fingerprint recognition device in accordance with the present invention as described above, the key control part 1912 of the fingerprint recognition processor 1910 transmits a predetermined alarm sound to the main control part 1961, whereupon the main control part outputs the alarm sound to the speaker 1963. Here, the voice generation part 1962 transmits the alarm sound from the main control part 1961 directly to the speaker 1963 without regenerating the same.

The speaker 1963 can be embodied either using the receiver of the wireless mobile communication terminal, or independently thereof.

The voice generation part 1962 can be embodied not only with the mobile communication terminal 1950, but also with the battery 1900.

The wire connection part 1964 can be connected to the fingerprint recognition processor 1917 via a cable, via the above power terminal, or via the above communication terminal to be installed separately for connection of the data by wire.

An unlock button 2003 for an order to unlock the door, a lock button 2004 for an order to lock the door, and a single fingerprint ignore button 2005 for allowing lock/unlock of the door by an (unregistered) deputy user of a registered user are provided for to the battery 1900, which is equipped with a fingerprint recognition processor 1910 as illustrated in Figs. 20a and 20b.

For protection of the fingerprint recognition part 1911, a sliding cover 2006 is attached to the battery 1900, which covers or opens the fingerprint recognition part 1911 by sliding itself to the left or to the right side.

The hole 2007 illustrated in Fig. 20a is for a connection cable with the mobile communication terminal.

Although not shown in Figs. 20a or 20b, the battery 1900 is equipped with a lamp 1915 attached exposed at the outside of the battery.

5 Fig. 21 illustrates configuration of a door lock/unlock control device capable of controlling locking/unlocking a door based on the fingerprint code information and the control code information provided from a fingerprint recognition device in accordance with the present invention in the embodiments in Figs. 19 and 20.

As shown in Fig. 21, the door lock/unlock control device 2100 for a door, to which  
10 the present invention applies, comprises a lock/unlock control part 2111 for controlling locking/unlocking the door based on the fingerprint code information and the control code information provided wireless from the fingerprint recognition device; a lock/unlock information storage part 2112 for storing the fingerprint code information received wireless from the fingerprint recognition device in accordance with the present invention; a door  
15 lock/unlock driver part 2113 for locking/unlocking the door by control of the lock/unlock control part 2111; a wireless transceiver part 2114 which transmits information transmission request signals from the lock/unlock control part 2111 to the fingerprint recognition device after having converted the same into wireless signals, and transmits the wireless fingerprint code information and control code information received from the  
20 fingerprint recognition device to the lock/unlock control part 2111 after having converted them into base band signals; a voice generation part 2115 for generation in voice of the signals relating to the current process of the door lock/unlock control device 2100 as provided by the lock/unlock control part 2111; a speaker 2116 which releases an alarm sound for prevention of a theft by control of the lock/unlock control part 2100 or outputs

voice signal as regenerated by the voice generation part 2115; and a lamp 2117 which generates light by control of the lock/unlock control part 2111 for prevention of a theft or indicates by light the current progress of the door lock/unlock device 2100.

If a connection is established between the lock/unlock control part 2111 upon  
5 request of a fingerprint recognition device of the present invention, the lock/unlock control part 2111 requests the key control part 1912 of the fingerprint recognition processor 1910 to transmit information, receives the fingerprint code information and the control code information from the key control part 1912 in response thereto, and controls the door lock/unlock driver 2113. Then, the lock/unlock control part 2111 drives the door  
10 lock/unlock driving part 2113 to unlock the door if the fingerprint code information provided by the key control part 1912 coincides with fingerprint code information stored in the lock/unlock information storage part 2112. Since the control code information comprises unlock/lock order of the door, the lock/unlock control part 2111 determines unlock/lock order of the key control part 1912 with this control code information.

15 The door lock/unlock driving part 2113, being an element for mechanical locking/unlocking of the door based on the control of the lock/unlock control part 2111, consisting of one or more relays and solenoids, can be embodied not restricted to such driving elements.

The speaker 2116, which outputs in voice the order of the lock/unlock control part  
20 2111 as regenerated by the voice generation part 2115, notifies the user in voice the current use process of the door lock/unlock control device 2100. The lock/unlock control part 2111 outputs predetermined manipulation orders of the door lock/unlock control device 2100 to the voice generation part 2115.

If a fingerprint code information not stored in the lock/unlock information storage



part 2112 has been received from the fingerprint recognition device as per the present invention, the lock/unlock control part 2111 outputs a predetermined alarm sound through the speaker 2116. Here, the voice generation part 2115 transmits the alarm sound from the lock/unlock control part 2111 directly to the speaker without regenerating the same.

5           The lamp 2117, which generates light by control of the lock/unlock control part 2111, indicates the current progress of the door lock/unlock device 2100 based on user's manipulation of this device or in association with a fingerprint recognition device as per the present invention, or warns for prevention of a theft. The lamp 2117 can also indicate the current progress of manipulation of the door lock/unlock device 2100 by generating  
10   differently colored lights.

The lock/unlock control part 2111 generates random numbers and stores them in the sequence of their generation in the lock/unlock information storage part 2112 as in Table 2, clearly indicating the year/month/date/time/minute/second of the generation.

Table 2:

Random Number Generation Sequence	Random Number	Time of the Generation (Year, month, day, time)
1	12345	2000122090001.00
2	56783	2000122090001.05
3	44532	2000122090001.55
4	78765	20001222091545.00
5	00010	20001222091547.50
6	90200	20001222095005.10
7	57987	20001222095500.00
8	53775	20001222095959.05
...	...	...
n	14091	20001222100000.05

The last number n of the above sequence amounts ca. 32000.

The random numbers and the sequence of their generation stored in the lock/unlock information storage part 2112 as above are transmitted to a fingerprint  
5 recognition device as per the present invention.

Here, the lock/unlock control device 2111 can transmit the random numbers of the random number table and the sequence of their generation to the fingerprint recognition device upon request thereof, or in predetermined intervals.

The random numbers thus transmitted from the door lock/unlock control device  
10 2100 are used for encoding the control code information, the fingerprint information, the additional information, etc. to be transmitted to the door.

Since the locking/unlocking process of a door using a fingerprint recognition key attached to the mobile communication terminal is almost the same as that given above in connection with Figs. 6 through 16, an explanation thereof is omitted.

15 The process of generating random numbers and the sequence of their generation as in Table 2 and of transmitting the same to a fingerprint recognition device as per the present invention in the course of locking/unlocking a door equipped with a door lock/unlock device as in Fig. 21 using a fingerprint recognition device as per the present invention as in Fig. 19 is explained below making reference to Figs. 22 and 23.

20 Fig 22, being a flowchart of the method for generating and transmitting a random number by a door to a fingerprint recognition device in accordance with an embodiment of the present invention, shows the process of generating a random number and transmitting the same upon request for random number transmission by a fingerprint recognition key as per the present invention while the door is in stand-by mode.

As shown in Fig. 22, upon application of power to the door lock/unlock control device 2100, the lock/unlock control device 2111 erases all information stored in the lock/unlock information storage part 2112 relative to random number, random number generation sequence, and random number generating time, and initializes the above  
5 random number table (2201).

After initialization of the random number table, the lock/unlock control part 2111 confirms whether a request signal for random number transmission has been received from the fingerprint recognition device (2202), and maintains stand-by mode until a random number transmission request signal is received from the fingerprint recognition device if  
10 no such signal has been received.

If it is confirmed in the above confirmation process (2202) that a random number transmission request signal has been received, the door lock/unlock control part 2111 generates random number generation sequence, random number, and time information of such generation (2205).

15 After the random numbers and the random number generation sequence have thus been established, the lock/unlock control part 2111 transmits the random numbers and the random number generation sequence both generated in response to the random number transmission request, wireless to a fingerprint recognition device as per the present invention (2206). Then, the lock/unlock control part 2111 confirms whether the random  
20 numbers and the random number generation sequence have been transmitted properly, and stores the random numbers, the random number generation sequence, and the information on time of their generation in the lock/unlock information storage part 2112 after having recorded them all in a random number table (2208).

If, however, it is confirmed in the above transmission confirmation process (2207)

that the random numbers have been transmitted improperly, the lock/unlock control part 2111 notifies thereof through the speaker 2116 and the lamp 2117, and stops generation and transmission of the random numbers (2209).

Fig 23 is a flowchart of the method for generating and transmitting a random  
5 number by a door to a fingerprint recognition device in accordance with another embodiment of the present invention, wherein the door generates random numbers and transmits them to a fingerprint recognition key as per the present invention in certain intervals.

As shown in Fig. 23, upon application of power to the door lock/unlock control  
10 device 2100, the lock/unlock control part 2111 erases the random numbers, the random number generation sequence, and the random number generation time recorded in the lock/unlock information storage part 2112 to initialize the random number table (2301).

After initialization of the random number table, the lock/unlock control part 2111  
15 generates the random number sequence (2302, 2303) as well as time information in respect to the random number generation (2304).

After generation of the random numbers and the random number generation  
sequence, the lock/unlock control part 2111 transmits wireless the generated random  
numbers and the random number generation sequence to the fingerprint recognition device  
(2305). Then, the lock/unlock control part 2111 confirms whether the random numbers and  
20 the random number generation sequence have been transmitted properly (2306), and stores  
the random numbers, the random number generation sequence, and information on time of  
their generation in the lock/unlock information storage part 2112 after having recorded  
them all in the random number table (2307).

After the above transmission and storage of the generated random numbers, the

lock/unlock control part 2111 confirms whether a predetermined time limit has elapsed (2308). The lock/unlock control part 2111 proceeds to the step of generating a random number generation sequence (2302) if the predetermined time limit has elapsed, otherwise, it maintains stand-by status until the predetermined time limit elapses.

5           If, however, it is confirmed in the above transmission confirmation process (2307) that the random numbers have been transmitted improperly, the lock/unlock control part 2111 notifies thereof through the speaker 2116 or the lamp 2117, and proceeds to the step of confirming the time (2308).

          In the following, a detailed explanation on how the random numbers, the random  
10   number generation sequence, and the time information on the random number generation produced as above are administered by the lock/unlock control part 2111 in the lock/unlock information storage part 2112, is given making reference to Fig. 24.

          As shown in Fig. 24, the lock/unlock control part 2111 searches continuously the random number generation time in the random number table stored in the lock/unlock  
15   information storage part 2112 (2401), and confirms whether any random number generation time information exists, wherein the time between the recorded random number generation time and the time of search exceeds a predetermined time limit (2402). If no random number generation time over the predetermined time limit exists, the lock/unlock control part 2111 then confirms whether the random numbers recorded in the random  
20   number table exceeds a certain number (2403), and maintains the recordation within a predetermined number by erasing the oldest random number, the oldest random number generation sequence, and the respective generation time information in the sequence of the recordation (2404).

          Then, the lock/unlock control part 2111 confirms whether the random numbers,



the random number generation sequence, and the random number generation time have been stored in proper order beginning from the initial address of the memory area allocated in the lock/unlock information storage part 2112 (2405).

If the above information has been stored in proper the order, the lock/unlock control part proceeds to the step of searching visual information (2401). If, however, the  
5 above information has not been stored in the proper order, the lock/unlock control part 2111 proceeds to the step of searching visual information (2401), after having stored the stored random numbers, the random number generation sequence, and the random number generation time in the memory areas allocated in the lock/unlock information storage part  
10 2112 in the order of the random number generation time beginning from the initial address of the above allocated memory area (2406).

If it is confirmed in the above confirming of the elapse of time (2402) that any random number generation time information exceeding the predetermined time limit exists, the lock/unlock control part 2111 proceeds to the step of confirming the number of the  
15 random numbers (2403), after having erased the random numbers, the random number generation sequence, and the random number generation time information exceeding the predetermined time from the above random number table (2407).

If it is confirmed in the above course of confirming the number of the random numbers (2403) that the number of stored random numbers does not exceed the  
20 predetermined number, the lock/unlock control part 2111 proceeds to the step of confirming the storage sequence (2405).

A detailed explanation on how the control information, the fingerprint information, and the additional information are encoded for transmission to the door by the fingerprint recognition device based on the random numbers transmitted from the door as described

above, follows making reference to Fig. 25.

As shown in Fig. 25, the key control part 1912 attached to the battery 1900 as in Fig. 19 transmits a random number transmission request signal to the lock/unlock control part 2111 of the door lock/unlock control device 2100, requesting transmission of a random number for encoding information (2501), and confirms whether a random number and a random number generation sequence have been received in response thereto from the door lock/unlock control device 2100 (2502).

If no random number has been received, the key control part 1912 maintains standby status until it receives a random number. If a random number has been received, the key control part 1912 encodes (2594) the control information, fingerprint information, and the additional information to be sent to the door based on the random number after having confirmed the composition of the random number (2503).

Here, the key control part 1912 encodes the control information, the fingerprint information, and the additional information based on the random number received, by reversing and shifting them in eight digits. For example, if the control information is "11101110" and the random number received is "01234", encoding of the control information proceeds as follows:

First, since the value of the first digit of the random number is "0", the key control part 1912 reverses the control information "11101110" to obtain "00010001", and then, since the value of the random number of the digit following the "0" is "1", shifts the first bit "0" to the last and shifts the other bits in a manner that the shifted first digit is filled, to obtain the control information "00100010".

Then, since the value of the random number of the digit following the "1" is "2", the key control part 1912 reverses the shifted control information "00100010" to obtain

"11011101", and then, since the value of the random number of the digit following the "2" is "3", shifts the first three bits "110" to the last three and shifts the other bits in a manner that the shifted first digits are filled, to obtain the control information "11101110".

After the control information is thus shifted to "11101110", since the value of the  
5 random number of the digit following the "3" is "4", the key control part 1912 finally reverses the shifted control information "11101110" to obtain "00010001", which result represents encoding of the control information "00010001" based on the random number "01234".

To elaborate, if the value of the random number is "0" or an even number, the  
10 control information is reversed; and if it is an odd number, the uppermost bit(s) of the control information corresponding to this value is shifted to the last in a manner that the shifted digit(s) is filled by the other bit(s).

Further, the transmitted information is not necessarily encoded in eight bits, but rather can also be encoded in 16 or 32 bits. Moreover, an even numbered value of the  
15 random number can be used as a shift order, while "0" and an odd numbered value of the random number can be used as a bit reverse order as well.

The fingerprint information and the additional information are also encoded in above described manner.

After the control information, the fingerprint information, and the additional  
20 information for transmission have been encoded as described above, the fingerprint recognition device as per the present invention transmits the random number generation sequence together with the above encoded information to the door (2505).

The data frame of the encoded information to be transmitted from the fingerprint recognition device to the door has a composition as in Table 3 below.

Table 3:

STX	Random Number Generation Sequence	Control Code	Fingerprint Code	Additional Information Code	ETX
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5           In the above Table, STX represents a frame initiating code, while ETX represents a frame ending code.

The control code represents a code for a user's order such as an order for door lock or door unlock, etc., while the additional information code represents an ID number of a fingerprint recognition device, an ID number of a door, user's personal information, etc.

10           As described above, if the encoded fingerprint information, the control information, and the additional information as well as the random number generation sequence have been received, the lock/unlock control part 2111 of the door lock/unlock control device 2100 confirms the random number to be encoded with the random number generation sequence.

15           After confirmation of the respective random number, the lock/unlock control part 2111 decodes the encoded information through a reverse process to the encoding, and controls locking/unlocking of the door in accordance with the decoded control information.

Fig. 26 illustrates configuration of a fingerprint recognition device using a mobile communication terminal and the battery installed therein in accordance with another embodiment of the present invention, wherein the fingerprint recognition device is consisted of a fingerprint input processor 2610, which senses and scans a user's fingerprint, and then, generates a fingerprint code; and a fingerprint information main processor 2660, which registers the fingerprint inputted by wire from the fingerprint input processor 2610

and erases a registered fingerprint information upon request of a user, encodes the inputted fingerprint information, the door lock/unlock control code which is a user order upon request of the door, and then provides wireless the encoded code information.

The fingerprint input processor 2610 is installed in the battery 2600, while the  
5 fingerprint information processor 2660 is installed in the mobile communication terminal 2650.

The fingerprint input processor 2610 installed in the battery 2600 comprises a fingerprint recognition part 2611 for sensing and scanning a user fingerprint; a fingerprint input control part 2612, which extracts the minutiae of the fingerprint scanned by the  
10 fingerprint recognition part 2611; a wire connection part 2613, which connects the fingerprint code generated by the fingerprint input control part 2612 to the fingerprint information main processor 2660; and a switch 2614, which applies power to the fingerprint recognition part 2611 if the fingerprint recognition part 2611 is switched by push thereon of a user.

15 The battery 2600 installed in a fingerprint input processor 2610 of the above configuration comprises a charge/discharge part 2615, which supplies power to the fingerprint input processor 2610 and the mobile communication terminal 2650 after it has been charged by power supplied from the charger; a regulator 2616 for stabilization of the power applied from the charge/discharge part 2615 to the fingerprint recognition processor  
20 2610; and the peripheral elements (not indicated in the drawing) for charging/discharging the charge/discharge part 2615 and supplying power to the mobile communication terminal 2650.

The fingerprint input control part 2612 extracts the minutiae of the fingerprints, such as ridges, valleys, ending points, bifurcation points, short ridges (or islands),



enclosures (or lakes), cross over, etc. of a fingerprint using image information of the fingerprint sensed through the fingerprint recognition part 2611, generates a fingerprint code (for each fingerprint) based on the minutiae, and then, transmits the same by wire to the fingerprint information main processor 2660 in the mobile communication terminal  
5 2650. Here, the fingerprint input control part 2612, being an eight or sixteen bits microprocessor equipped with a counter (or clock), an interrupter, a serial or a parallel port, etc., comprises an operation system and a small volume memory such as a ROM for storing the basic driving program and a RAM.

Further, the fingerprint information main processor 2660 installed in the mobile  
10 communication terminal 2650 comprises a main control part 2661, which controls registration and erase of a fingerprint inputted through the fingerprint recognition part 2611 upon request of a user, encodes the fingerprint code information as well as the control code information upon request of the door, and provides the encoded code information; a fingerprint information storage part 2662 for storing the fingerprint code information  
15 provided by the main control part 2661; a wireless transceiver part 2663, which receives the wireless signal transmitted from the door to transmit the same further to the main control part 2661, and transmits the encoded code information received from the main control part 2661 to the door after having converted it into wireless signal; a lamp 2664, which generates light for prevention of a theft under control of the main control part 2661,  
20 or indicates by light the current process of the fingerprint recognition device as per the present invention in use; a wire connection part 2665 for connection of signals exchanged between the fingerprint input control part 2612 in the battery 2600 and the main control part 2661; a voice generation part 2666 for regenerating voice signal of the signal on the current process of the fingerprint recognition device as per the present invention in use as

provided by the main control part 2661; and a speaker 2667, which releases alarm sound for prevention of a theft under control of the main control part 2661, or outputs voice signal as regenerated by the voice generation part 2666.

Users' orders for registration/erase of a fingerprint, for initialization of the  
5 registered information, for locking/unlocking the door, etc. are inputted via the keypad 2668. The mobile communication terminal 2650 displays on its LCD screen 2668 the current process of the fingerprint recognition device in use based on the contents provided by the main control part 2661.

The fingerprint information storage part 2662 can be embodied as a flash memory,  
10 RAM, and the like, having a small memory capacity sufficient for storing several kbytes. The fingerprint information storage part 2662 stores user fingerprint code information as provided by the main control part 2661 in the sequence of their registration, and other information such as the additional information (e.g. user personal information, etc.), user fingerprint codes for single fingerprint ignore process, etc.

15 Since the lamp 2664 operates in almost the same manner as the lamp 1915 in Fig. 19, an explanation thereof is omitted.

The wire connection part 2613 of the battery 2600 can exchange data with the wire connection part 2665 of the mobile communication terminal 2650 via the above communication terminal attached separately for wire connection of data, via a cable  
20 connected to this communication terminal, or via the power terminal for application of power from the battery 2600 to the mobile communication terminal 2650.

The speaker 2667, which outputs order of the main control part 2661 in voice as regenerated by the voice generation part 2664, notifies in voice the current process of the fingerprint recognition device as per the present invention in use.

If an unauthorized third person manipulates the fingerprint recognition device as per the present invention, the main control part 2661 outputs a predetermined alarm sound via the speaker 2666. Here, the voice generation part 2666 transmits the alarm sound from the main control part 2662 directly to the speaker 2666 without regenerating it.

5           The speaker 2666 can be embodied using the receiver of the wireless mobile communication terminal 2650, or separately from such receiver.

Although the present invention has been described above with reference to the preferred embodiments and accompanying drawings, it should be noted that the scope of the rights of the present invention is not limited thereto, but rather shall be determined by  
10   the appended claims, allowing various alterations, modifications and adjustments as those skilled in the art will understand.

### **Industrial Applicability**

15

As explained above, the present invention, by locking/unlocking a door or starting a vehicle using a fingerprint recognition key, which can be charged and driven by power applied to the door or to the vehicle, achieves the following effects:

Since the fingerprint recognition key of the present invention is driven by power  
20   applied to the door or to the starting device of the vehicle, the fingerprint recognition key allows a user to lock/unlock a door or to start a vehicle with convenience, using the fingerprint recognition key, even when all power in the key has been discharged.

Since the portable fingerprint recognition key allows driving of a vehicle, a motorcycle, etc., by wire or wireless, using fingerprint information, it helps to prevent a

theft of the vehicle, the motorcycle, etc.

Since the fingerprint code information is transmitted via a low power LAN, leaking of the fingerprint code information can be prevented.

Since the fingerprint recognition key of the present invention is portable, a malfunction of the fingerprint recognition part or a deterioration of the fingerprint recognition function due to low temperature can be avoided.

Since a portable fingerprint recognition key and a door lock/unlock control device installed at inside of the door, eventual damages thereof due to their outward disposure can be prevented.

Since start of a vehicle, a motorcycle, etc. is controlled by a double operation of key recognition and fingerprint recognition, reliability in both the stability of the start and the security of the fingerprint information is substantially enhanced.

Since the present invention allows lock/unlocking of a door by a mobile communication terminal with fingerprint recognition function added thereto and a battery installed to the same, it provides the user with more convenience in both carrying and using the mobile communication terminal.

Since the fingerprint information is changed using random numbers generated at each locking/unlocking of the door, leaking of fingerprint information of a user required for locking/unlocking a door by wire trapping can effectively be prevented.

Since possible wire trapping of a user's fingerprint information is prevented by random numbers generated at each locking/unlocking of the door, trust of the users in the product security can substantially be enhanced.

**What is claimed is:**

1. A fingerprint recognition key for controlling a lock device using fingerprint information, comprising:

5 a charge/discharge means, which is charged by the power from the lock device while the fingerprint recognition key is connected to said lock device and supplies power for driving said fingerprint recognition key;

a fingerprint recognition means for recognition of users' fingerprints;

10 a key control means, which registers/erases fingerprints inputted through said fingerprint recognition means and provides fingerprint code information and control code information upon request of a door or a vehicle;

a fingerprint information storage means for storing fingerprint code information provided by said key control means;

15 a wireless transceiver means, which receives wireless request signals from said door or said vehicle to subsequently transmit the same to said key control means, and transmits fingerprint information received from said key control means to said door or said vehicle after having converted the same into wireless signal;

a warning means for notifying the current process of said fingerprint recognition key in use under control of said key control means; and

20 a wire connection means, which connects the inputted signal to said key control means, and connects the fingerprint information transmitted from said key control means by wire to said door or said vehicle, while it is connected to said door or said vehicle.

2. The fingerprint recognition key as set forth in Claim 1, comprising additionally



a switching means for switching the power from said charge/discharge means to said fingerprint recognition means upon switching on by a user through a push on said fingerprint recognition means.

5           3. The fingerprint recognition key as set forth in Claim 1 or Claim 2, wherein said warning means comprises:

a voice generation part for generation in voice signal of the signal relative to the current progress of said fingerprint recognition key in use as provided by said key control means;

10           a speaker for releasing a warning sound for prevention of a theft by control of said key control means or for outputting a voice signal as regenerated by said voice generation part; and

one or more lamps for generating light for prevention of a theft by control of said key control means or for indicating the current progress of said fingerprint recognition key  
15   in use.

4. The door lock/unlock control device as set forth in Claim 1, which controls locking/unlocking of a door based on the fingerprint information and control information transmitted from said fingerprint recognition key, comprising:

20           a charge means for charging said the charge/discharge means of said fingerprint recognition key using the power supplied externally;

a key insertion sensing means for sensing the insertion of said fingerprint recognition key;

a lock/unlock control means, which, while insertion of said fingerprint recognition

key is sensed by said key insertion sensing means, controls locking/unlocking of the door based on the fingerprint code information and control code information provided by wire or wireless from said fingerprint recognition key;

a lock/unlock information storage means for storing the fingerprint code  
5 information received by wire or wireless from said fingerprint recognition key through said lock/unlock control means;

a wireless transceiver means, which transmits the information transmission request signal from said lock/unlock control means to said fingerprint recognition key after having converted the same into wireless signal, and transmits the wireless fingerprint code  
10 information and control code information received from said fingerprint recognition key to said lock/unlock control means after having converted the same into base band signals;

a warning means for notifying the current process of said door lock/unlock control device in use under control of said door lock/unlock control means; and

a wire connection means, which connects by wire the information transmission  
15 request signal from said lock/unlock control means to said fingerprint recognition key, and connects the fingerprint code information and control code information transmitted by wire from said fingerprint recognition key to said lock/unlock control means.

5. The door lock/unlock control device as set forth in Claim 4, wherein said  
20 warning means comprises:

a voice generation part for generation in voice signal of the signal relative to the current progress of said lock/unlock device in use as provided by said lock/unlock control means;

a speaker for releasing a warning sound for prevention of a theft by control of said

lock/unlock control means or for outputting a voice signal as regenerated by said voice generation part; and

one or more lamps for generating light for prevention of a theft by control of said lock/unlock control means or for indicating the current progress of said lock/unlock device  
5 in use.

6. The door lock/unlock device as set forth in Claim 4, wherein a power terminal for connection with said power terminal of said fingerprint recognition key is attached to said lock/unlock control device in order to allow power supplied from said charge means  
10 be applied to said fingerprint recognition key.

7. The door lock/unlock device as set forth in Claim 4, wherein said lock/unlock means receives by wire the fingerprint code information and control code information transmitted from said fingerprint recognition key, when said wire connection means is  
15 connected to said fingerprint recognition key.

8. The fingerprint recognition key as set forth in any one of Claims 4 through 7, wherein said fingerprint recognition key comprises the first and the second fixation latches, one at each side thereof, at a part to be inserted in said door, in order to allow said  
20 fingerprint recognition key to be fixed when it is inserted in said door.

9. The door lock/unlock control device as set forth in Claim 8, wherein said door comprises the first and the second fixing parts for fixing said first and second fixing latches when said fingerprint recognition key is inserted.

10. A vehicle start control device for controlling start of a vehicle based on the fingerprint code information and control code information transmitted from said fingerprint recognition key in Claim 1, comprising:

5       a charge means for charging said the charge/discharge means of said fingerprint recognition key using the power supplied externally;

      a key insertion and location sensing means for sensing insertion of said fingerprint recognition key and the location of insertion of said fingerprint recognition key;

      a start control means, which, while insertion of said fingerprint recognition key as  
10       well the location of insertion are sensed by said key insertion and location sensing means, controls starting of the vehicle based on the fingerprint code information and control code information provided by wire or wireless from said fingerprint recognition key;

      a start information storage means for storing the fingerprint code information received by wire or wireless from said fingerprint recognition key through said start  
15       control means;

      a starting device driving means for controlling start of said vehicle by control of said start control means;

      a wireless transceiver means, which transmits the information transmission request signal from said start control means to said fingerprint recognition key after having  
20       converted the same into wireless signal, and transmits the wireless fingerprint code information and control code information received from said fingerprint recognition key to said start control means after having converted the same into base band signals;

      a warning means for notifying the current process of said vehicle start control device in use under control of said start control means; and

a wire connection means, which connects by wire the information transmission request signal from said start control means to said fingerprint recognition key, and connects the fingerprint code information and control code information transmitted by wire from said fingerprint recognition key to said start control means.

5

11. The vehicle start control device as set forth in Claim 10, wherein said warning means comprises:

a voice generation part for generation in voice signal of the signal relative to the current progress of said start control device in use as provided by said start control means;

10 a speaker for releasing a warning sound for prevention of a theft by control of said start control means or for outputting a voice signal as regenerated by said voice generation part; and

one or more lamps for generating light for prevention of a theft by control of said start control means or for indicating the current progress of said start control device in use.

15

12. The vehicle start control device as set forth in Claim 10, wherein a power terminal for connection with said power terminal of said fingerprint recognition key is attached to said start control device in order to allow power supplied from said charge means be applied to said fingerprint recognition key.

20

13. The vehicle start control device as set forth in Claim 10, wherein said start control means receives by wire the fingerprint code information and control code information transmitted from said fingerprint recognition key, when said wire connection means is connected to said fingerprint recognition key.



14. The fingerprint recognition key as set forth in any one of Claims 10 through 13, wherein said fingerprint recognition key comprises the first and the second fixation latches, one at each side thereof, at a part to be inserted in the start device of said vehicle, in order  
5 to allow said fingerprint recognition key to be fixed when it is inserted in the start device of said vehicle.

15. The vehicle start control device as set forth in Claim 14, wherein the start device of said vehicle comprises the first and the second fixing parts for fixing said first  
10 and second fixing latches when said fingerprint recognition key is inserted.

16. The vehicle start control device as set forth in Claim 15, wherein said fingerprint recognition key turns a predetermined angle clockwise and or counter-clockwise in a status fixed by said first and second fixation parts, in order to turn on/turn  
15 off starting said vehicle.

17. The vehicle start control device as set forth in Claim 16, wherein said key insertion and location sensor senses whether said fingerprint recognition key, while fixed by said first and second fixation parts, is located at start on position or as start off position,  
20 and then transmits the results to said start control means.

18. A method for locking/unlocking a door equipped with a door lock/unlock control device using a fingerprint recognition key capable of recognizing fingerprint information, comprising:

the first step, wherein, upon push of the registration button on said fingerprint recognition key, said fingerprint recognition key receives fingerprint information of a user inputted, generates a registration code as well as a user fingerprint code for said inputted user fingerprint information, and transmits them by wire or wireless to said door  
5 lock/unlock control device;

the second step, wherein said door lock/unlock control device 300 registers anew or additionally the user fingerprint code inputted via said fingerprint recognition key based on the registration request as per the registration code.

the third step, wherein, upon push of the single fingerprint ignore button on said  
10 fingerprint recognition key, said fingerprint recognition key receives fingerprint information of a user inputted, generates a single fingerprint ignore code as well as a user fingerprint code for said inputted user fingerprint information, and transmits them by wire or wireless to said door lock/unlock control device;

the fourth step, wherein said door lock/unlock control device ignores  
15 authentication process of registered users based on the single fingerprint ignorance code, and resets the user authentication process ignore setting after completion of the locking/unlocking operation of the door;

the fifth step, wherein, upon push of the door lock button on said fingerprint recognition key, said fingerprint recognition key receives fingerprint information of a user,  
20 generates a (door) lock code as well as a user fingerprint code for said inputted user fingerprint information, and transmits them by wire or wireless to said door lock/unlock control device;

the sixth step, wherein said door lock/unlock control device locks said unlocked door based on the lock request as per said lock code;

the seventh step, wherein, upon push of the door unlock button on said fingerprint recognition key, said fingerprint recognition key receives fingerprint information of a user, generates a unlock code as well as a user fingerprint code for said inputted user fingerprint information, and transmits them by wire or wireless to said door lock/unlock control  
5 device;

the eighth step, wherein said door lock/unlock control device unlocks said door based on the unlock request as per said unlock code;

the ninth step, wherein, upon push of the initialization button on said fingerprint recognition key, said fingerprint recognition key receives fingerprint information of a user,  
10 generates an initialization code as well as a user fingerprint code for said inputted user fingerprint information, and transmits them by wire or wireless to said door lock/unlock control device; and

the tenth step, wherein said door lock/unlock control device erases all information registered based on the initialization request as per said initialization code.

15

19. The method for locking/unlocking a door as set forth in Claim 18, wherein said first step comprises:

the step 1-1, wherein, upon push of said registration button, said fingerprint recognition key confirms whether a user fingerprint information has been inputted within a  
20 predetermined time limit;

the step 1-2, wherein said registration or additional registration process of fingerprint information terminates, if no fingerprint information has been inputted at said step 1-1;

the step 1-3, wherein said fingerprint recognition key generates said registration

code, a user fingerprint code for said inputted user fingerprint information, and transmits them by wire or wireless to the door lock/unlock control device, if the fingerprint information has been inputted;

the step 1-4, wherein said fingerprint recognition key confirms whether a  
5 fingerprint input request code of a registered user has been received within a predetermined time limit from transmission of said registration code;

the step 1-5, wherein said registration or additional registration process of fingerprint information terminates, if no fingerprint information has been inputted at said step 1-4; and

10 the step 1-6, wherein if a fingerprint input request code has been received in the course of the confirmation in said step 1-4, said fingerprint recognition key receives fingerprint information of the registered user, generates a registered user fingerprint code, and transmits them by wire or wireless to the door lock/unlock control device .

15 20. The method for locking/unlocking a door as set forth in Claim 18, wherein said second step comprises:

the step 2-1, wherein said door lock/unlock control device receives said registration code inputted from said fingerprint recognition key;

20 the step 2-2, wherein said door lock/unlock control device searches the lock/unlock information storage part to confirm whether one or more fingerprints of the user are registered;

the step 2-3, wherein said door lock/unlock control device registers the fingerprint code requested to be registered, if it is confirmed at said step 2-2 that no fingerprint code is registered;

the step 2-4, wherein said door lock/unlock control device confirms whether any of the registered fingerprint code stored in said lock/unlock information storage part coincides with the fingerprint code inputted through said fingerprint recognition key, if it is confirmed at said step 2-2 that one or more fingerprint codes are registered;

5       the step 2-5, wherein said door lock/unlock control device notifies the user of the existence of registered identical fingerprint code, if it is confirmed at said step 2-2 that a coinciding fingerprint code exists;

the step 2-6, wherein said door lock/unlock control device requests the user to input a registered fingerprint of the user in order to confirm whether the person whose  
10       fingerprint has currently been inputted is an authorized new user, if it is confirmed at said 2-2 that no coinciding fingerprint code exists;

the step 2-7, wherein said door lock/unlock control device confirms whether a registered fingerprint of the user has been inputted within a predetermined time limit in response to said request;

15       the step 2-8, wherein said door lock/unlock control device notifies that the requested fingerprint code has not been inputted, if it is so confirmed at said step 2-2;

the step 2-9, wherein said door lock/unlock control device confirms whether one or more fingerprint codes registered in said lock/unlock information storage part coincide with the inputted fingerprint code, if it is confirmed at said step 2-7 that the requested  
20       fingerprint code has been inputted;

the step 2-10, wherein said door lock/unlock control device notifies that the user fingerprint code desired to be additionally registered cannot be registered, if it is confirmed at said step 2-9 that no fingerprint code coincides; and

the step 2-11, wherein said door lock/unlock device additionally registers the



fingerprint code desired to be registered, if it is confirmed at said step 2-9 that a fingerprint code coincides.

21. The method for locking/unlocking a door as set forth in Claim 18, wherein said  
5 third step comprises:

the step 3-1, wherein said fingerprint recognition key confirms whether a user fingerprint has been inputted within a predetermined time limit upon push of said single fingerprint ignore button;

the step 3-2, wherein the locking/unlocking process by single fingerprint ignore  
10 procedure terminates, if it is confirmed at said step 3-1 that no such user fingerprint has entered;

the step 3-3, wherein said fingerprint recognition key generates said single fingerprint authentication ignore code, a user fingerprint code for the inputted user fingerprint information, and stores them in the fingerprint storage part, if it is confirmed at  
15 said step 3-1 that such user fingerprint has entered;

the step 3-4, wherein, said fingerprint recognition key confirms whether said unlock button has been pushed;

the step 3-5, wherein locking/ unlocking of said door as per said user authentication ignore process terminates, if it is confirmed at said step 3-4 that said unlock  
20 button was not pushed; and

the step 3-6, wherein said fingerprint recognition key transmits the single fingerprint authentication ignore code and the user fingerprint code stored in said fingerprint information storage part to said door lock/unlock control device, and erases said stored single fingerprint authentication ignore code and user fingerprint code, if it is

confirmed at said step 3-4 that said unlock button was pushed.

22. The method for locking/unlocking a door as set forth in Claim 18, wherein said fourth step comprises:

5           the step 4-1, wherein said door lock/unlock control device confirms whether said single fingerprint ignore code has been inputted from said fingerprint recognition key;

          the step 4-2, wherein locking/ unlocking of said door as per user authentication ignore process terminates, if it is confirmed at said step 4-1 that said single fingerprint ignore code was not inputted;

10          the step 4-3, wherein said door lock/unlock control device confirms whether one or more registered fingerprint codes stored in said lock/unlock information storage part coincide with the fingerprint code inputted through said fingerprint recognition key, if it is confirmed at said step 4-1 that said single fingerprint ignore code has been inputted;

          the step 4-4, wherein said door lock/unlock control device notifies that cannot the  
15   deputy user cannot lock/unlock said door due to an in-coincidence of the inputted fingerprint code with the registered fingerprint codes, if it is confirmed at said step 4-3 that no coinciding fingerprint code exists;

          the step 4-5, wherein said door lock/unlock control device unlocks said door, and sets the user authentication ignore mode for a predetermined time limit, if it is confirmed at  
20   said step 4-3 that a coinciding fingerprint code exists; and

          the step 4--6, wherein said door lock/unlock control device cancels said user authentication ignore mode, if a predetermined time has elapsed after setting of said mode, or the mode change button has been pushed.

23. The method for locking/unlocking a door as set forth in Claim 18, wherein said fifth step comprises:

the step 5-1, wherein said fingerprint recognition key confirms whether user fingerprint information has been inputted within a predetermined time limit;

5 the step 5-2, wherein said fingerprint recognition key maintains said door unlocked, if it is confirmed at said step 5-1 that no such user fingerprint information has been inputted; and

the step 5-3, wherein said fingerprint recognition key generates said lock code, a user fingerprint code for the inputted fingerprint information, and transmits them to said  
10 door lock/unlock control device, if it is confirmed at said step 5-1 that no such user fingerprint information has been inputted.

24. The method for locking/unlocking a door as set forth in Claim 18, wherein said sixth step comprises:

15 the step 6-1, wherein said door lock/unlock control device confirms whether a lock code has been inputted from said fingerprint recognition key;

the step 6-2, wherein said door lock/unlock control device terminates lock process and maintains said door unlocked, if it is confirmed at said step 6-1 that no lock code has been inputted;

20 the step 6-3, wherein said door lock/unlock control device confirms whether one or more registered fingerprint codes stored in the lock/unlock information storage part coincide with the fingerprint code inputted through said fingerprint recognition key, if it is confirmed at said step 6-1 that a lock code has been inputted;

the step 6-4, wherein said door lock/unlock control device locks said door and

outputs a message thereon, if it is confirmed at said step 6-3 that there exists a coinciding fingerprint code; and

the step 6-5, wherein said door lock/unlock control device notifies that the door cannot be locked due to the in-coincidence of the inputted fingerprint code with registered  
5 fingerprint codes, if it is confirmed at said step 6-3 that no coinciding fingerprint code exists.

25. The method for locking/unlocking a door as set forth in Claim 18, wherein said seventh step comprises:

10 the step 7-1, wherein said fingerprint recognition key confirms whether user fingerprint information has been inputted within a predetermined time limit from a push on said unlock button;

the step 7-2, wherein said fingerprint recognition key maintains said door locked, if it is confirmed at said step 7-1 that no such user fingerprint information has been  
15 inputted; and

the step 7-3, wherein said fingerprint recognition key generates said unlock code, a user fingerprint code for the inputted fingerprint information, and transmits them to said door lock/unlock control device, if it is confirmed at said step 7-1 that no such user fingerprint information has been inputted.

20

26. The method for locking/unlocking a door as set forth in Claim 18, wherein said eighth step comprises:

the step 8-1, wherein said door lock/unlock control device confirms whether an unlock code has been inputted from said fingerprint recognition key;

the step 8-2, wherein said door lock/unlock control device terminates unlock process and maintains said door locked, if it is confirmed at said step 8-1 that no unlock code has been inputted;

the step 8-3, wherein said door lock/unlock control device confirms whether one  
5 or more registered fingerprint codes stored in the lock/unlock information storage part coincide with the fingerprint code inputted through said fingerprint recognition key, if it is confirmed at said step 8-1 that an unlock code has been inputted;

the step 8-4, wherein said door lock/unlock control device unlocks said door and outputs a message thereon, if it is confirmed at said step 8-3 that there exists a coinciding  
10 fingerprint code; and

the step 8-5, wherein said door lock/unlock control device notifies that the door cannot be unlocked due to the in-coincidence of the inputted fingerprint code with registered fingerprint codes, if it is confirmed at said step 8-3 that no coinciding fingerprint code exists.

15

27. The method for locking/unlocking a door as set forth in Claim 18, wherein said ninth step comprises:

the step 9-1, wherein said fingerprint recognition key confirms whether user fingerprint information has been inputted within a predetermined time limit from a push on  
20 said initialization button;

the step 9-2, wherein said fingerprint recognition key terminates transmitting the code information required for initialization, if it is confirmed at said step 9-1 that no such user fingerprint information has been inputted;

the step 9-3, wherein said fingerprint recognition key generates said initialization



code, a user fingerprint code for the inputted user fingerprint information, and transmits them to said door lock/unlock control device, if it is confirmed in said step 9-1 that no such user fingerprint information has been inputted;

the step 9-4, wherein said fingerprint recognition key confirms whether a  
5 fingerprint input request code of the registered user has been received within a predetermined time period from transmission of said code;

the step 9-5, wherein said fingerprint recognition key terminates transmission of code information required for the initialization; and

the step 9-6, wherein said fingerprint recognition key receives registered  
10 fingerprint information of the user inputted, generates a fingerprint code of the registered user, and transmits them to said door lock/unlock control device, if it is confirmed at said step 9-4 that said fingerprint input request code has been received.

28. The method for locking/unlocking a door as set forth in Claim 18, wherein said  
15 tenth step comprises:

the step 10-1, wherein said door lock/unlock control device confirms whether said initialization code has been received from said fingerprint recognition key;

the step 10-2, wherein said door lock/unlock control device confirms whether one  
or more registered fingerprint codes stored in the lock/unlock information storage part  
20 coincide with the fingerprint code inputted through said fingerprint recognition key;

the step 10-3, wherein said door lock/unlock control device notifies that the registered information cannot be erased due to the in-coincidence of the fingerprint codes, if it is confirmed at said step 10-2 that no coinciding fingerprint code exists.

the step 10-4, wherein said door lock/unlock control device notifies the user of the

coincidence of fingerprint codes, request the user to input his fingerprint to confirm if the person who currently inputs his fingerprint is authorized as a new user, and transmits a fingerprint input request code to said fingerprint recognition key, if it is confirmed at step 10-2 that one or more fingerprint codes exist;

5           the step 10-5, wherein said door lock/unlock control device confirms whether a registered fingerprint of the user has been inputted within a predetermined time limit in response to said fingerprint input request;

          the step 10-6, wherein said door lock/unlock control device notifies that the requested fingerprint code has not been inputted, if it is confirmed at said step 10-5 that no  
10   such fingerprint code was not inputted;

          the step 10-7, wherein said door lock/unlock control device confirms whether one or more fingerprint codes registered at said lock/unlock information storage part coincide with said inputted fingerprint code, if it is confirmed at said step 10-5 that such fingerprint code has been inputted;

15           the step 10-8, wherein said door lock/unlock control device notifies that initialization of the information registered at said lock/unlock information storage part is not possible, if it is confirmed at said step 10-7 that no coinciding fingerprint code exists;

          the step 10-9, wherein said door lock/unlock control device erases all information registered at said lock/unlock information storage part and outputs a message on this result,  
20   if it is confirmed at said step 10-7 that coinciding fingerprint code is existent.

29. A method for controlling start of a vehicle equipped with a vehicle start control device using a fingerprint recognition key capable of recognizing fingerprint information, comprising:

the first step, wherein, upon placing of said fingerprint recognition key at the start on position while inserted in the starting device of said vehicle, said vehicle start control device transmits a user fingerprint information transmission request code to said fingerprint recognition key, requesting input of the user fingerprint and transmission of the  
5 inputted user fingerprint information;

the second step, wherein said fingerprint recognition key generates a start initiating code and a fingerprint code for the inputted user fingerprint information, and transmits them to said vehicle start control device, in response to said request; and

the third step, wherein, upon input of said user fingerprint code and said start  
10 initiating code, said vehicle start control device confirms whether one or more registered fingerprint codes coincide with said inputted user fingerprint code.

30. The method for controlling start of a vehicle as set forth in Claim 29, wherein said second step comprises:

15 the step 2-1, wherein said fingerprint recognition key confirms whether a user fingerprint transmission request code has been received from said vehicle start control device;

the step 2-2, wherein said fingerprint recognition key maintains stand-by status, if it is confirmed at said step 2-1 that no user fingerprint information transmission request  
20 recode has been received;

the step 2-3, wherein said fingerprint recognition key confirms whether the inputted user fingerprint has properly been scanned, if it is confirmed at said step 2-1 that such a user fingerprint information transmission request has been received;

the step 2-4, wherein said fingerprint recognition key notifies that the fingerprint

was not properly scanned, and then proceeds to said step 2-1, if it is confirmed at said step 2-3 that the fingerprint was not properly scanned; and

the step 2-5, wherein said fingerprint recognition key generates said start initiating code, a fingerprint code for said inputted user fingerprint information, and  
5 transmits them to said vehicle start control device, if it is confirmed at said step 2-3 that the fingerprint was properly scanned.

31. The method for controlling start of a vehicle as set forth in Claim 29, wherein said third step comprises:

10 the step 3-1, wherein said vehicle start control device confirms whether said user fingerprint code has been received from said fingerprint recognition key;

the step 3-2, wherein said vehicle start control device proceeds to said first step, if it is confirmed at said step 3-1 that no such user fingerprint code has been received;

the step 3-3, wherein said vehicle start control device confirms whether said start  
15 initiating code has been received from said fingerprint recognition key, if it is confirmed at said step 3-1 that such a user fingerprint code has been received;

the step 3-4, wherein said vehicle start control device notifies that starting said vehicle is not possible because said start initiating code was not received, if it is confirmed at said step 3-3 that said start initiating code has not been received;

20 the step 3-5, wherein said vehicle start control device confirms whether one or more of said registered fingerprint codes coincide with the inputted fingerprint code, if it is confirmed at said step 3-3 that said start initiating code has been received;

the step 3-6, wherein said vehicle start control device notifies that starting said vehicle is not possible because the inputted fingerprint code does not coincide with the

registered fingerprint codes, if it is confirmed at said step 3-5 that no coinciding fingerprint code exists;

the step 3-7, wherein said vehicle start control device initiates starting said vehicle, if it is confirmed at said step 3-5 that a coinciding fingerprint code exists;

5 the step 3-8, wherein said vehicle start control device confirms whether said vehicle has properly started;

the step 3-9, wherein said vehicle start control device notifies that said vehicle has not properly started and proceeds to said first step, if it is confirmed at said step 3-8 that said vehicle has not properly started; and

10 the step 3-10, wherein said vehicle start control device generates a start completion code signifying proper start of said vehicle and transmits the same to the fingerprint recognition key, if it is confirmed at said step 3-8 that said vehicle has properly started.

32. A fingerprint recognition device capable of locking/unlocking a door by  
15 transmitting wireless fingerprint information, comprising:

a fingerprint recognition processing means, which, attached to a first electronic apparatus, registers/erases a user fingerprint information by order of the user, encodes the inputted fingerprint code as well as the door lock/unlock control code which is a user order by request of the door, and provides the encoded code information; and

20 a wire/wireless signal connection processing means, which, attached to a second electronic apparatus that is attachable to/detachable from said first electronic apparatus, transmits signals received wireless from said door and user orders on registration/erase of the fingerprint information to said fingerprint recognition processing means, and said encoded code information transmitted from said fingerprint recognition



processing means to said door after having converted them into wireless signals.

33. The fingerprint recognition device as set forth in Claim 32, wherein said  
secondelectronic apparatus is a wireless mobile communication terminal, while said first  
5 electronic apparatus is a battery installed in said mobile communication terminal.

34. The fingerprint recognition device as set forth in Claim 33, wherein said  
battery is equipped with:

an unlock button for an unlock order of said door;  
10 a lock button for a lock order of said door; and  
a single fingerprint ignore button to enable unlocking of said door by an  
unregistered deputy user.

35. The fingerprint recognition device as set forth in Claim 33, wherein said user  
15 order for erase/registration of said fingerprint information and various user orders for  
manipulation of said fingerprint recognition device are inputted via key pad of said mobile  
communication terminal.

36. The fingerprint recognition device as set forth in any one of Claims 33 through  
20 35, wherein said fingerprint recognition processing means comprises:

a fingerprint recognition part for recognizing a user fingerprint;  
a key control part, which controls registering/erase of a user fingerprint  
information by order of the user inputted through said mobile communication terminal,  
encodes the fingerprint code information as well as the control code information based on

the random numbers from said door, and provides the encoded code information;

a storage part for storing the fingerprint code information from said key control part;

5 a wireless transceiver part, which receives wireless signals from said door to subsequently transmit the same to said key control part, and transmits information received from said key control part to said mobile communication terminal after having converted the same into wireless signal;

10 a lamp for generating warning light for prevention of a theft or indicating by light the current process of said fingerprint recognition device in use under control of said key control part;

a switch, which applies power to said fingerprint recognition part when it is switched on by push of a user on said fingerprint recognition part; and

15 a wire connection means, which connects the signal transmitted by wire from said mobile communication terminal to said key control means, and connects the fingerprint information transmitted from said key control means by wire to said key control part.

20 37. The fingerprint recognition device as set forth in Claim 36, wherein said wireless transceiver part connects signals exchanged wireless between said battery and said door by control of said key control part, while said battery is separated from said mobile communication terminal.

38. The fingerprint recognition device as set forth in any one of Claims 33 through 35, wherein said wire/wireless signal connection processing means comprises:

a main control part, which transmits user order inputted from keypad of said

mobile communication terminal to said fingerprint recognition processor, controls exchange of various information between said fingerprint recognition processor and said door, and indicates the current status of use of said fingerprint recognition processor;

a voice generation part, which regenerates in voice the signals for current process  
5 of said fingerprint recognition processor as provided by said main control part;

a speaker, which releases a warning sound for prevention of a theft, or outputs voice signal as regenerated by said voice generation part;

a wire connection part, which connects signal received by wire from said fingerprint recognition processor to said main control part, and connects signal received  
10 from said main control part to said fingerprint recognition processor by wire; and

a wireless transceiver part, which transmits the information provided from said fingerprint recognition processor to the door after having received and converted the same into wireless signal, and receives the wireless signal provided from said door to said fingerprint recognition processor to transmit the same to said main control part.

15

39. The fingerprint recognition device as set forth in Claim 38, wherein said mobile communication terminal indicates the current status of the manipulation process of said fingerprint recognition device on an LCD installed on it.

20 40. A fingerprint recognition device capable of locking/unlocking a door by transmitting wireless fingerprint information, comprising:

a fingerprint input processing means, which is attached to a first electronic apparatus for sensing and scanning a user fingerprint to generate a fingerprint code; and

a fingerprint information main processing means, which, attached to a

secondelectronic apparatus that is attachable to/detachable from said first electronic apparatus, registers/erase the fingerprint information inputted by wire from said fingerprint input processing means by order of a user, encodes the fingerprint code information and the door lock/unlock codes which signify user orders by request of said door, and provides  
5 the encoded code information.

41. The fingerprint recognition device as set forth in Claim 40, wherein said secondelectronic apparatus is a wireless mobile communication terminal, while said first electronic apparatus is a battery installed in said mobile communication terminal.  
10

42. The fingerprint recognition device as set forth in Claim 40, wherein said user orders for erase/registration of fingerprint information and said various user orders for manipulation of said fingerprint recognition device are inputted through keypad of said mobile communication terminal.  
15

43. The fingerprint recognition device as set forth in Claim 41 or Claim 42, wherein said fingerprint input processing means comprises:

a fingerprint recognition part, which senses a fingerprint and scans said sensed fingerprint;

20 a fingerprint input control part, which extracts the minutiae of the fingerprint scanned by said fingerprint recognition part and generates a fingerprint code;

a wire connection part, which connects said fingerprint code generated by said fingerprint input control part to said fingerprint recognition processing means; and

a switch, which applies power to said fingerprint recognition part when it is

switched on by push of a user on said fingerprint recognition part.

44. The fingerprint recognition device as set forth in Claim 41 or Claim 42, wherein said fingerprint information main processing means comprises:

5       a main control part, which controls registration/erase of fingerprints inputted through said fingerprint recognition part by order of a user, encodes the fingerprint information as well as control code information based on the random number from said door, and provides said encoded code information;

10       a fingerprint information storage part for storing the fingerprint code information provided from said main control part;

      a wireless transceiver part, which receives the wireless signal provided from said door to transmit the same to said main control part, and transmits the encoded code information from said main control part to said door after having converted the same into wireless signal;

15       one or more lamps, which generates light for prevention of a theft or for indicating the current process of said fingerprint recognition device in use by control of said main control part;

      a wire connection part, which connects signals exchanged between said battery and said main control part by wire;

20       a voice generation part, which regenerates in voice the signal for current process of said fingerprint recognition device in use as provided by said main control part; and

      a speaker, which releases a warning sound for prevention of a theft, or outputs voice signal as regenerated by said voice generation part.



45. The fingerprint recognition device as set forth in Claim 44, wherein said mobile communication terminal indicates the current progress of the manipulation of said fingerprint recognition device on an LCD equipped thereon.

5           46. A method for locking/unlocking a door using a fingerprint recognition key capable of recognizing fingerprint information, comprising:

the first step, wherein said door waits to receive a random number transmission request signal from said fingerprint recognition device while the random number stored in said door has been initialized;

10           the second step, wherein, upon receiving said random number transmission request signal, said door generates a random number generation sequence, a random number, information on the random number generation, and then, transmits them to said fingerprint recognition device; and

the third step, wherein, upon proper receiving of said generated random number, 15 said door registers said generated random number, said random number generation sequence, and said time information in said random number table, and stores the same in the memory.

47. The method for locking/unlocking a door as set forth in Claim 46, wherein said 20 random number generation sequence at said second step is the sequence of generation of said generated random number.

48. The method for locking/unlocking a door as set forth in Claim 47, wherein said information on random number generation time at said second step comprises the year,

month, date, time, minute, and second of generation of said random number.

49. The method for locking/unlocking a door as set forth in any one of Claims 46 through 48, wherein said third step comprises:

5       the step 3-1, wherein said door confirms whether said random number and said random number generation sequence have properly been transmitted;

          the step 3-2, wherein said door registers said generated random number, said random number generation sequence and said information on random number generation time in said random number table, and stores them in said memory, if it is confirmed that  
10       said random number has properly been transmitted; and

          the step 3-3, wherein said door warns that said generated random number has not been properly transmitted, if it is confirmed that said random number has not been properly transmitted.

15       50. A method for locking/unlocking a door using a fingerprint recognition key capable of recognizing fingerprint information, comprising:

          the first step, wherein said door generates a random number generation sequence, a random number and information on the random number generation, and transmits them to said fingerprint recognition key while the random number stored in said door has been  
20       initialized;

          the second step, wherein, upon having properly transmitted said generated random number, said door registers said generated random number, a random number generation sequence, and information on the random number generation in said random number table, and then, stores them in the memory; and

the third step, wherein said door proceeds to said first step upon elapse of a predetermined time period after storing of said random number.

51. The method for locking/unlocking a door as set forth in Claim 50, wherein said  
5 random number generation sequence in said first step is the sequence of generation of said generated random numbers.

52. The method for locking/unlocking a door as set forth in Claim 50, wherein said  
information on random number generation time at said first step comprises the year, month,  
10 date, time, minute, and second of generation of said random number.

53. The method for locking/unlocking a door as set forth in any one of Claims 50  
through 52, wherein said second step comprises:

the step 2-1, wherein said door confirms whether said random number and said  
15 random number generation sequence have properly been transmitted;

the step 2-2, wherein said door registers said generated random number, said  
random number generation sequence and said information on random number generation  
time in said random number table, and stores them in said memory, if it is confirmed that  
said random number has properly been transmitted; and

20 the step 2-3, wherein said door warns that said generated random number has not  
been properly transmitted, if it is confirmed that said random number has not been properly  
transmitted.

54. The method for administering random numbers generated in Claims 46 or 50,

for use in a lock device comprises:

the first step, wherein, if a search in said information on random number generation time in said random number table yields random number(s), of which the generation time has elapsed a predetermined time limit at the time of said search, said  
5 random number(s), random number generation sequence, and information on random number generation time are all erased from said random number table;

the second step, wherein, if the random numbers recorded in said random number table exceeds a certain number, the recordation is maintained within a predetermined number by erasing the oldest random number, the oldest random number generation  
10 sequence, and the respective generation time information in the sequence of the recordation; and

the third step wherein, said random number, random number generation sequence, and information on random number generation time are stored in the memory areas allocated to in the order of the random number generation time beginning from the initial  
15 address of the above allocated memory area in the order of generation of the random numbers, after having been confirmed whether they are so stored.

55. The method for locking /unlocking a door as set forth in Claim 54, wherein said first step comprises:

20 the step 1-1, wherein the random number generation time registered in said random number table is searched;

the step 1-2, wherein it is confirmed whether random number(s) exists, of which the generation time has elapsed a predetermined time limit at the time of said search;

the step 1-3, wherein said random numbers, said random number generation

sequence, and said random number generation time information, confirmed at said step 1-2 to exceed the predetermined time, are all erased from said random number table; and

the step 1-4, wherein said process proceeds to said second step, if it is confirmed at said step 1-2 that the predetermined time limit has not elapsed.

5

56. The method for locking/unlocking a door as set forth in Claim 54, wherein said second step comprises:

the step 2-1, wherein it is confirmed whether the number of random numbers registered in said random number table exceeds a predetermined number;

10 the step 2-2, wherein the recordation is maintained within a predetermined number by erasing the oldest random number, the oldest random number generation sequence, and the respective generation time information in the sequence of the recordation; and

the step 2-3, wherein said process proceeds to said second step, if it is confirmed at said step 2-1 that the predetermined number was not exceeded.

15

57. The method for locking/unlocking a door as set forth in any one of Claims 54 through 56, wherein said third step comprises:

20 the step 3-1, wherein it is confirmed whether said random number, random number generation sequence, and information on random number generation time are stored in said allocated memory areas in order, beginning from the initial address;

the step 3-2, wherein said process proceeds to said first step, if it is confirmed at said step 3-1 that said random number, random number generation sequence, and information on random number generation time are stored in order; and

the step 3-3, wherein the process proceeds to said first step after having stored said



random number, random number generation sequence, and information on random number generation time in the memory areas in order, beginning from the initial address of said allocated memory area, if it is confirmed at said step 3-1 that they are not stored in order.

5           58. The method for locking/unlocking a door based on the generated random number as set forth in Claim 46 or Claim 50, comprising:

the first step, wherein a fingerprint recognition device transmits a random number transmission request signal requesting transmission of a random number for encoding information to said door;

10           the second step, wherein said fingerprint recognition device confirms the random number generation sequence and configuration of the random number provided from said door; and

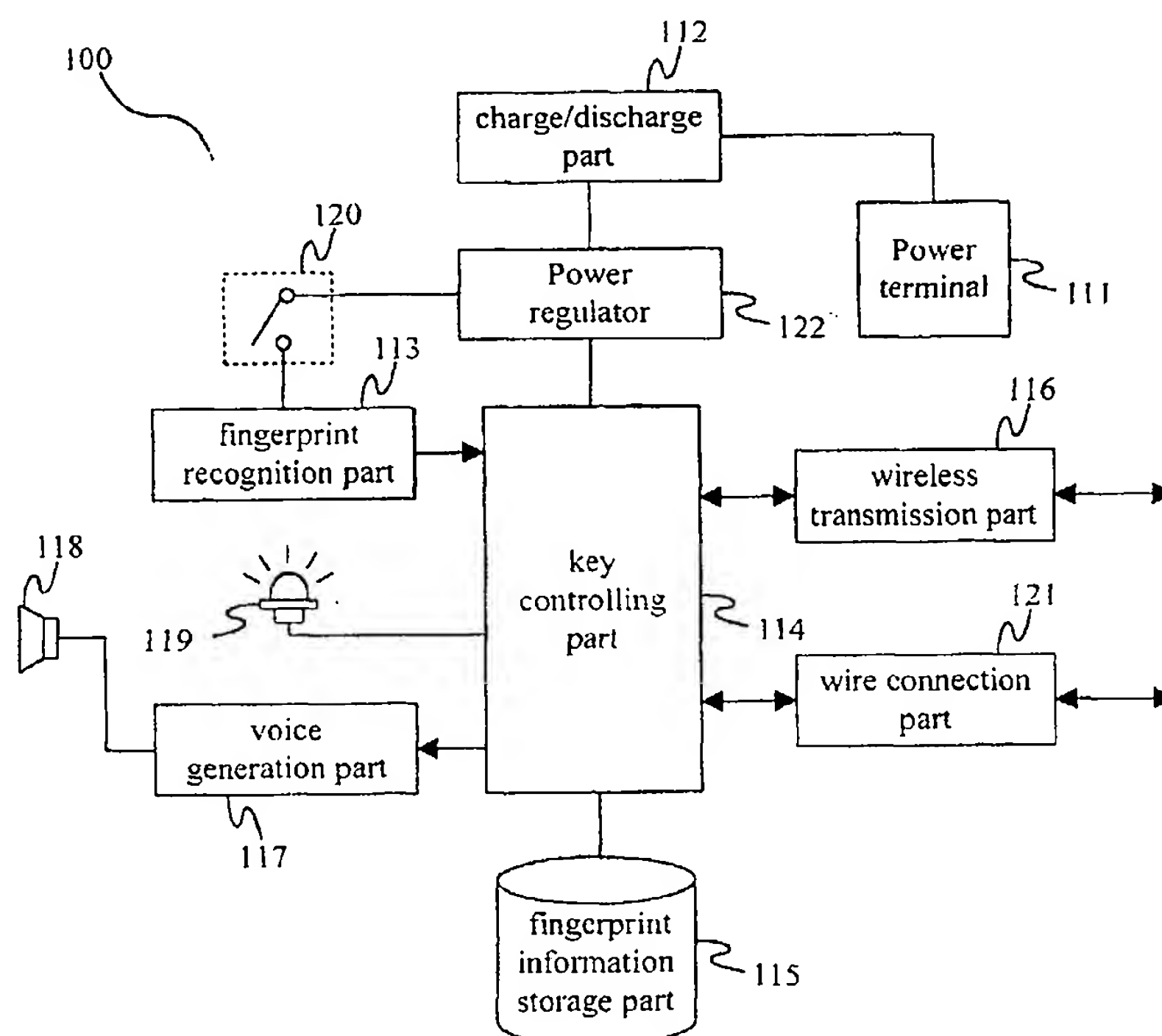
the third step, wherein the control information, fingerprint information, and additional information to be transmitted are encoded based on the configuration of said random number, and the encoded code information is transmitted to said door.

15

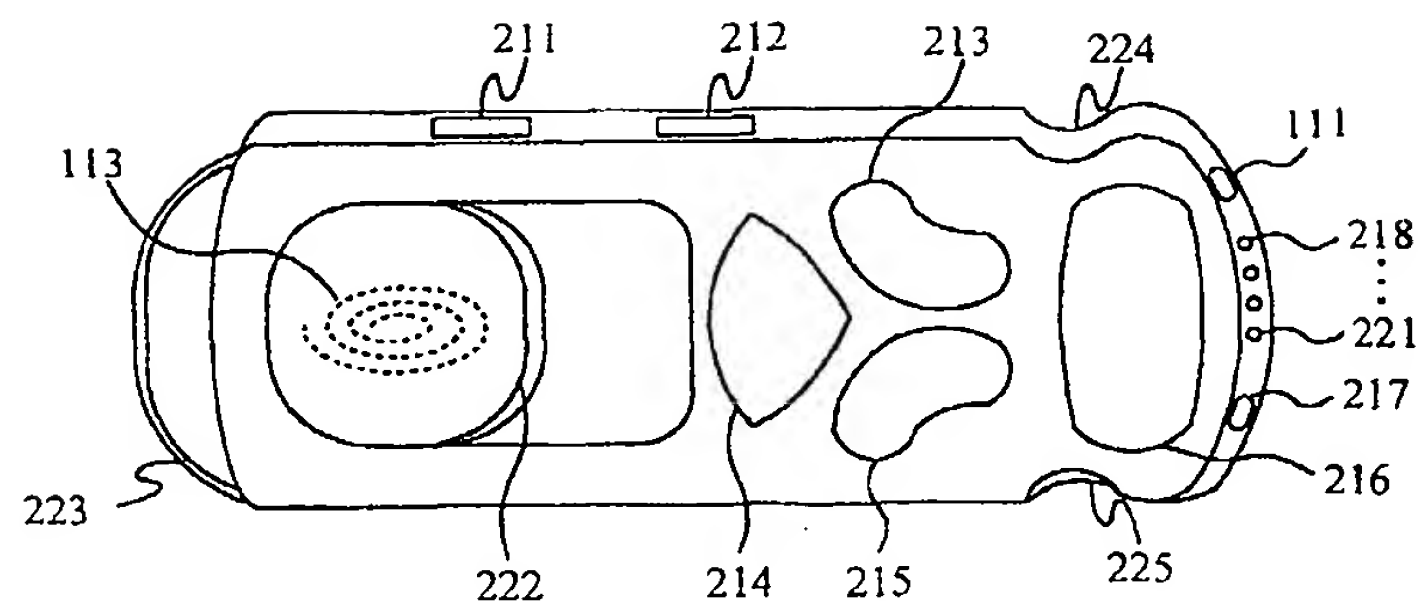
59. The method for locking/unlocking a door as set forth Claim 58, wherein said transmitted information is reversed if the value of said random number is "0" or an even number; and, if the value of the random number is an odd number, the uppermost bit(s) of said transmitted information corresponding to this value is shifted to the last in a manner that the shifted digit(s) is filled by the other bit(s).

20

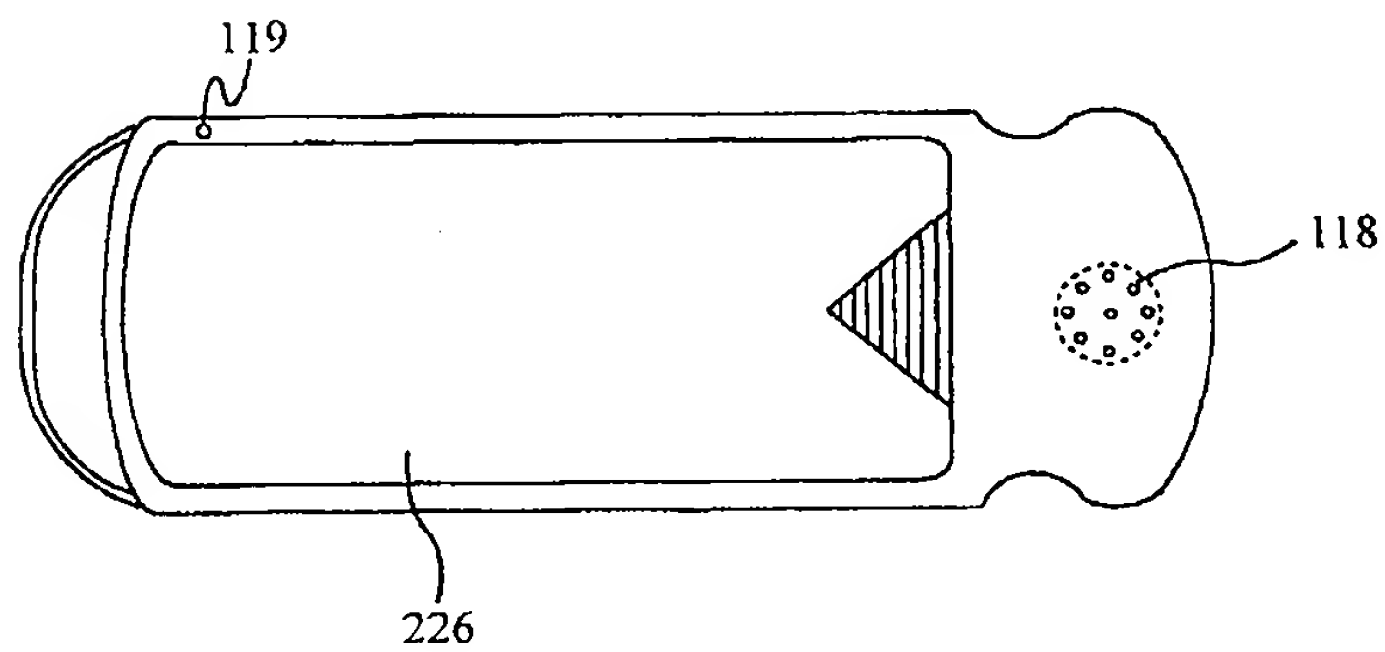
【Fig. 1】



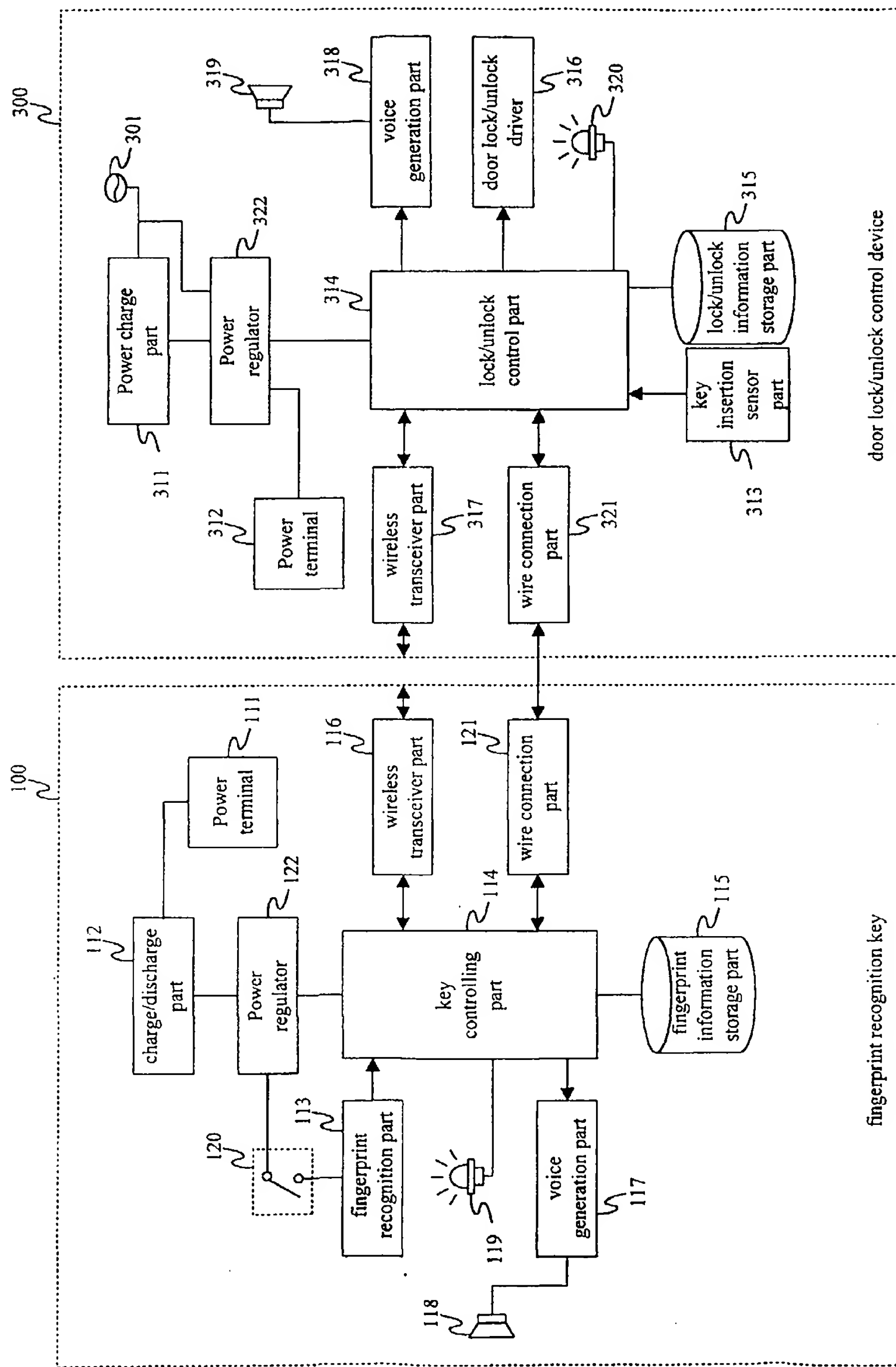
【Fig. 2a】



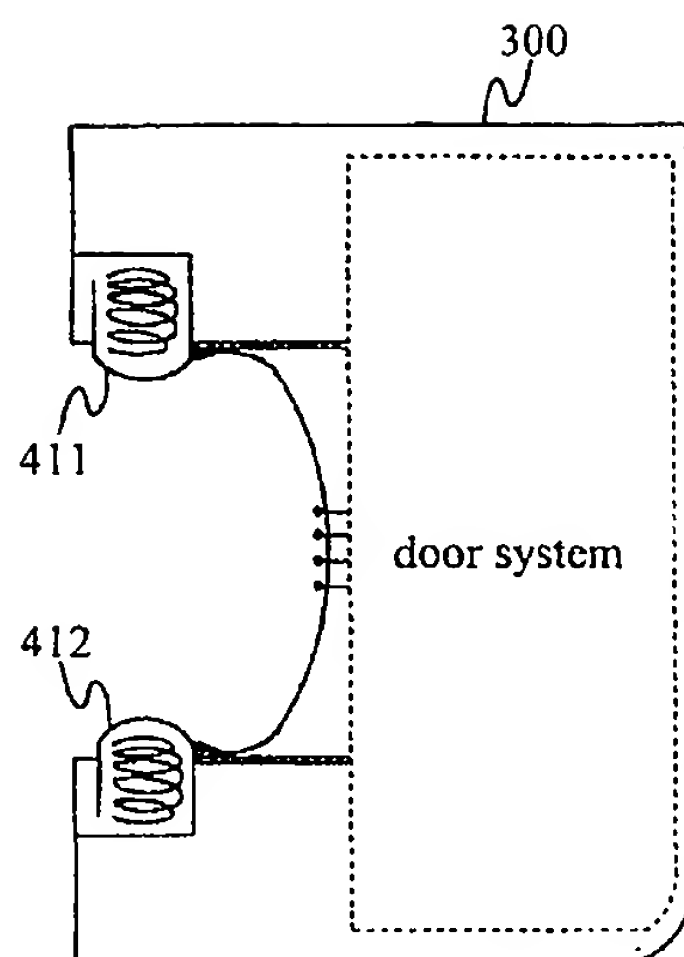
【Fig. 2b】



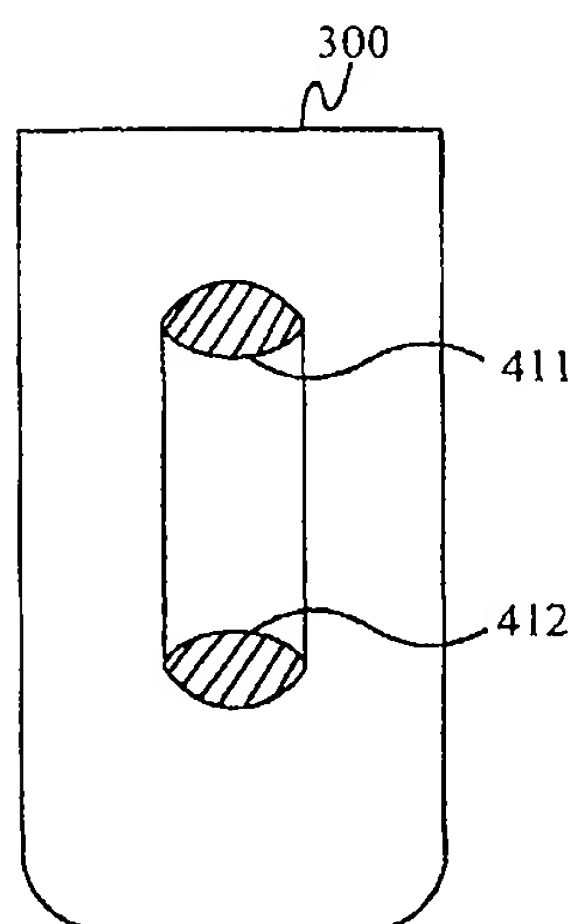
【Fig. 3】



【Fig. 4a】

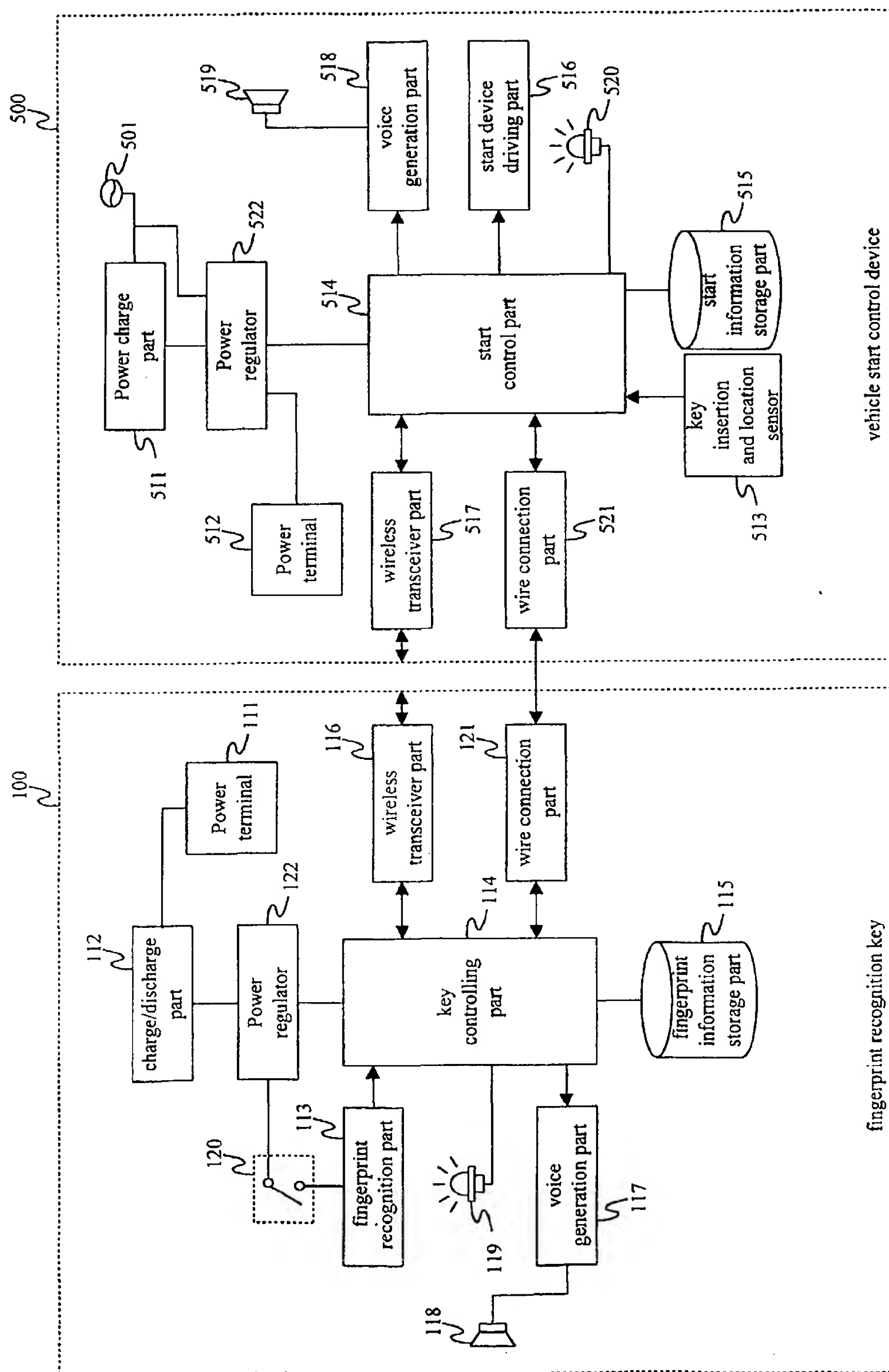


【Fig. 4b】

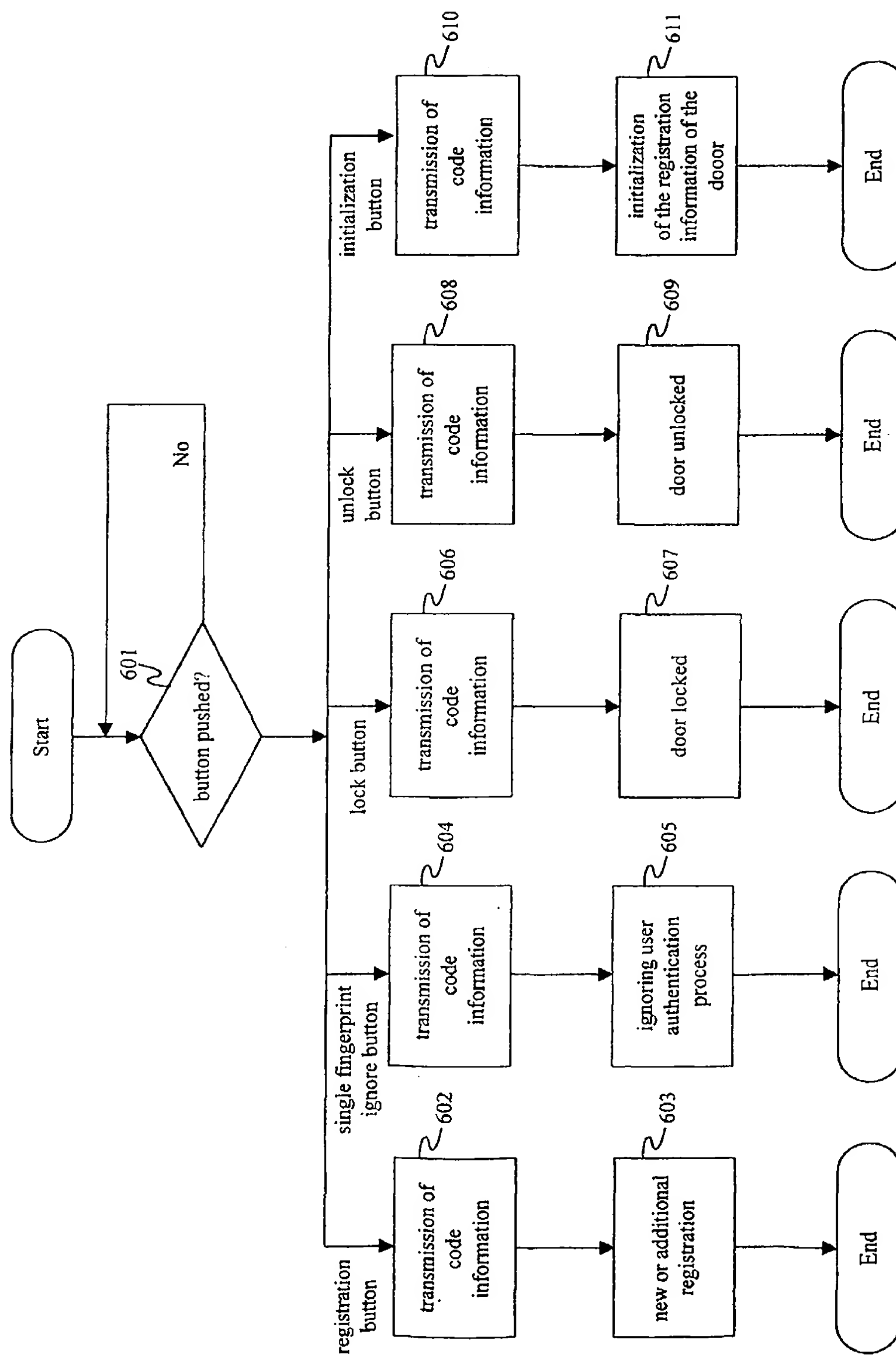




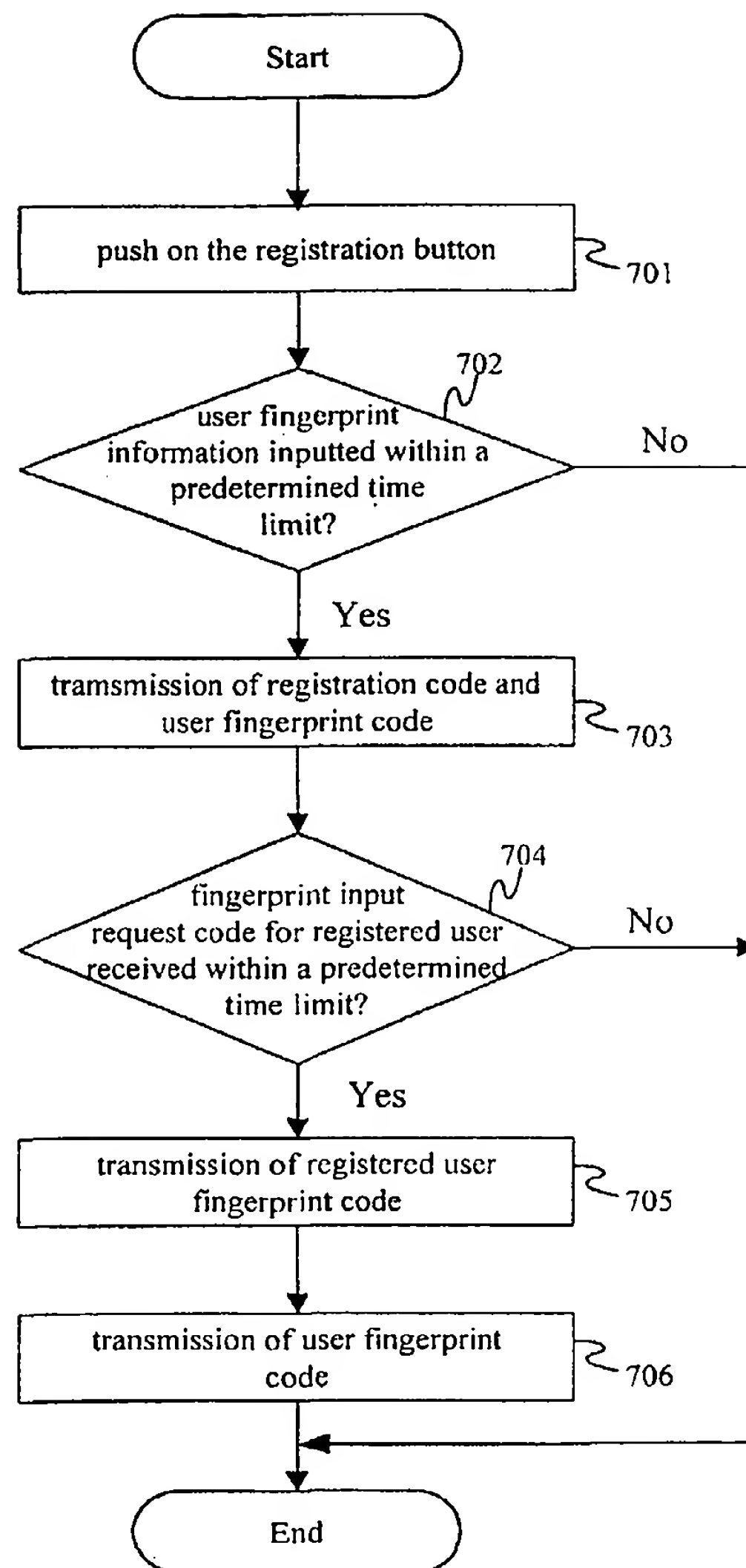
【Fig. 5】



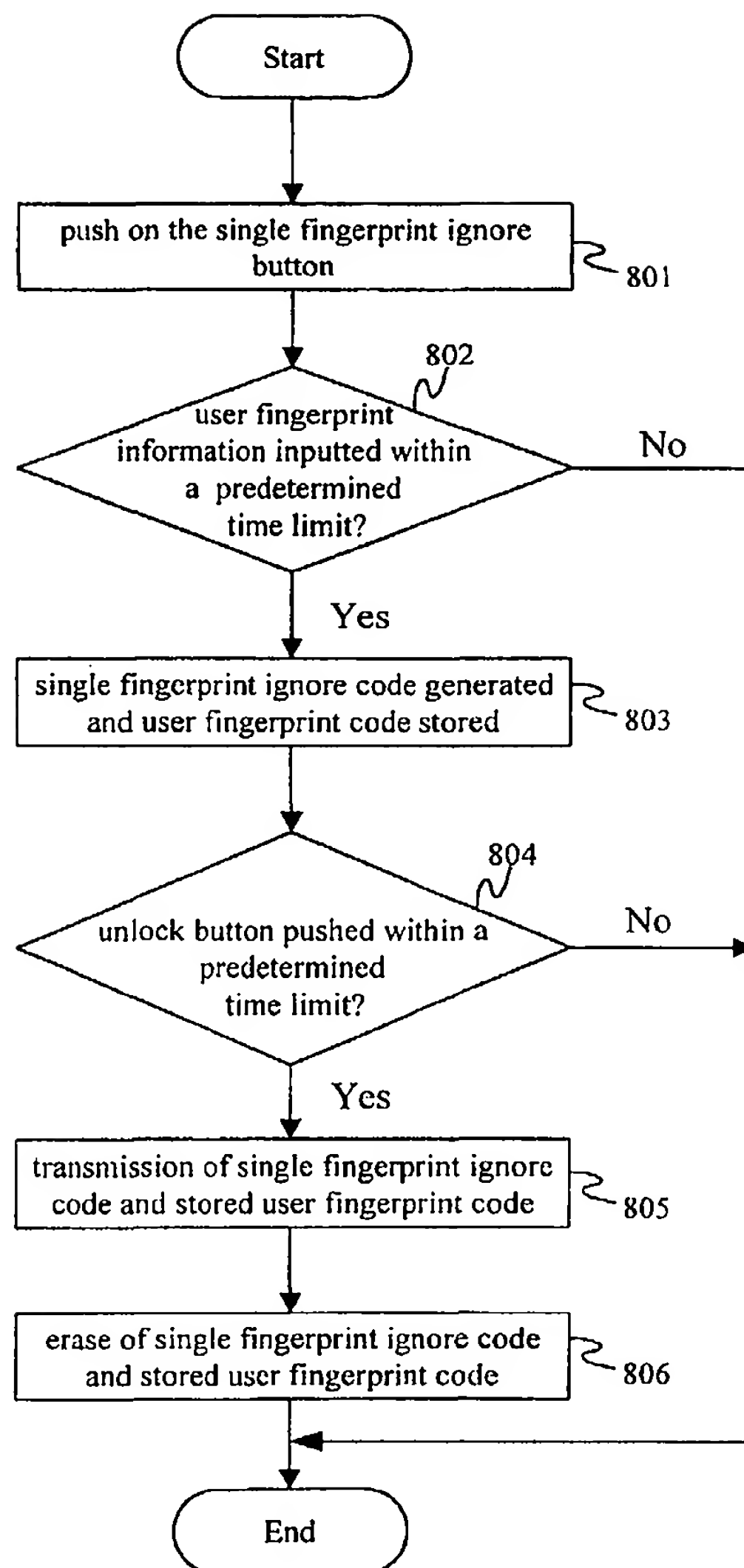
【Fig. 6】



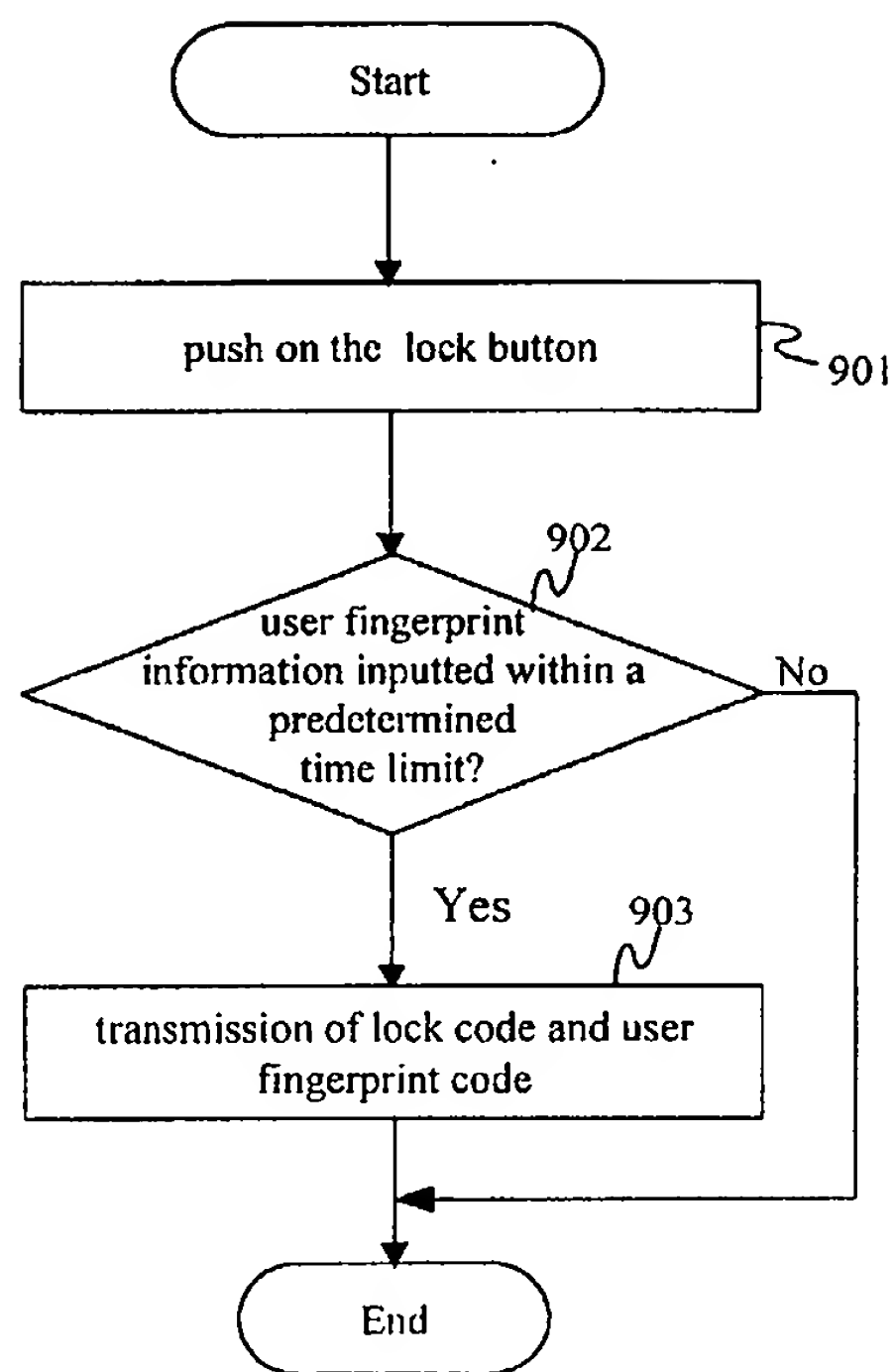
【Fig. 7】



【Fig. 8】

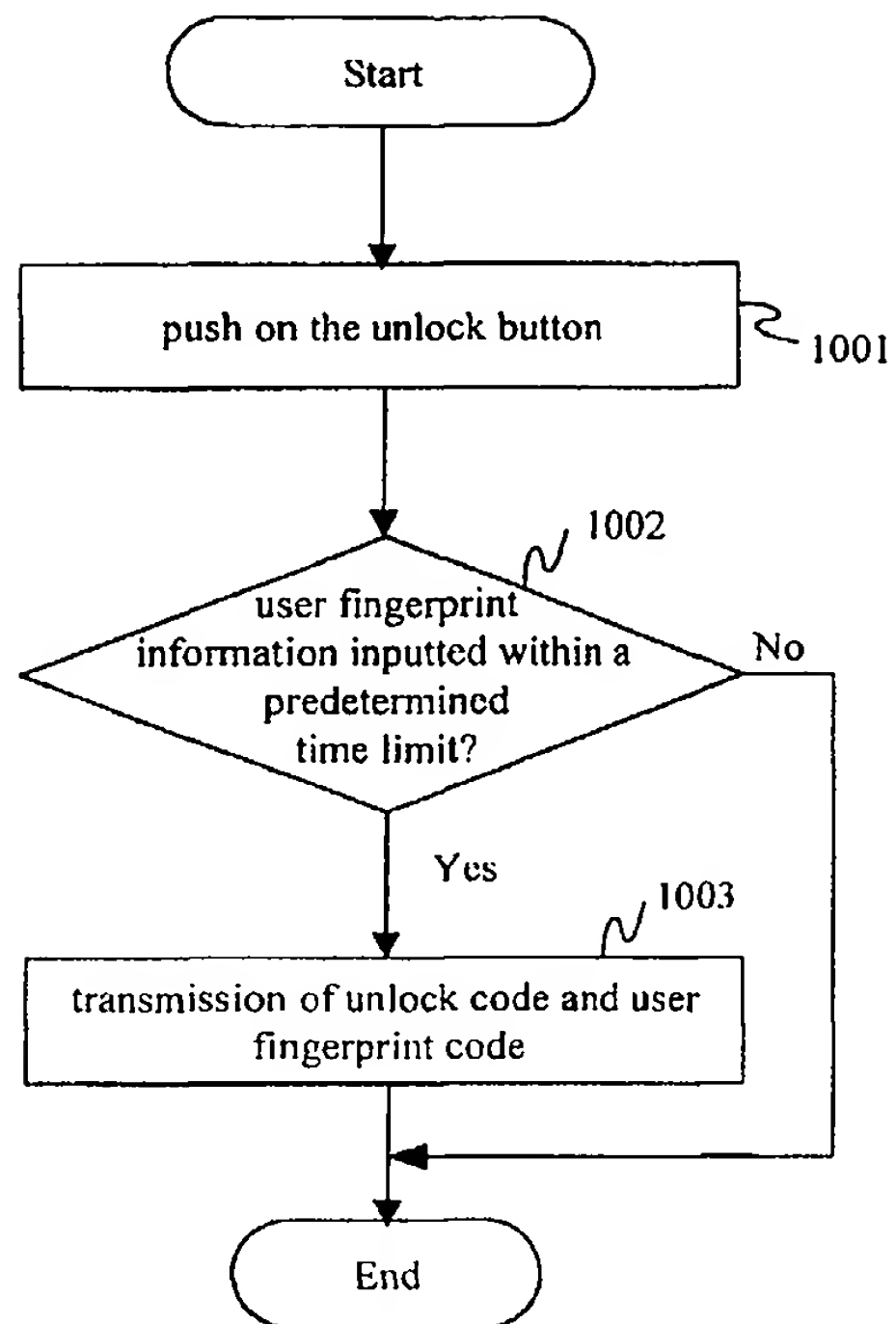


【Fig. 9】

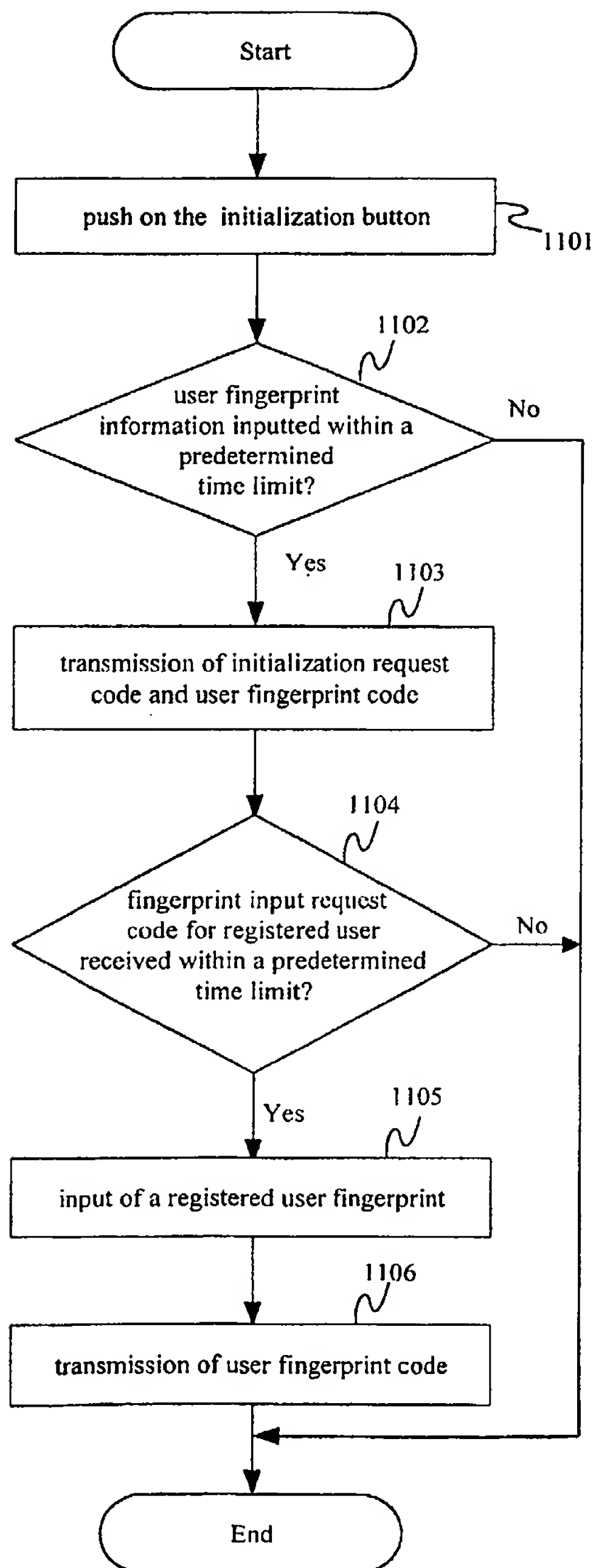




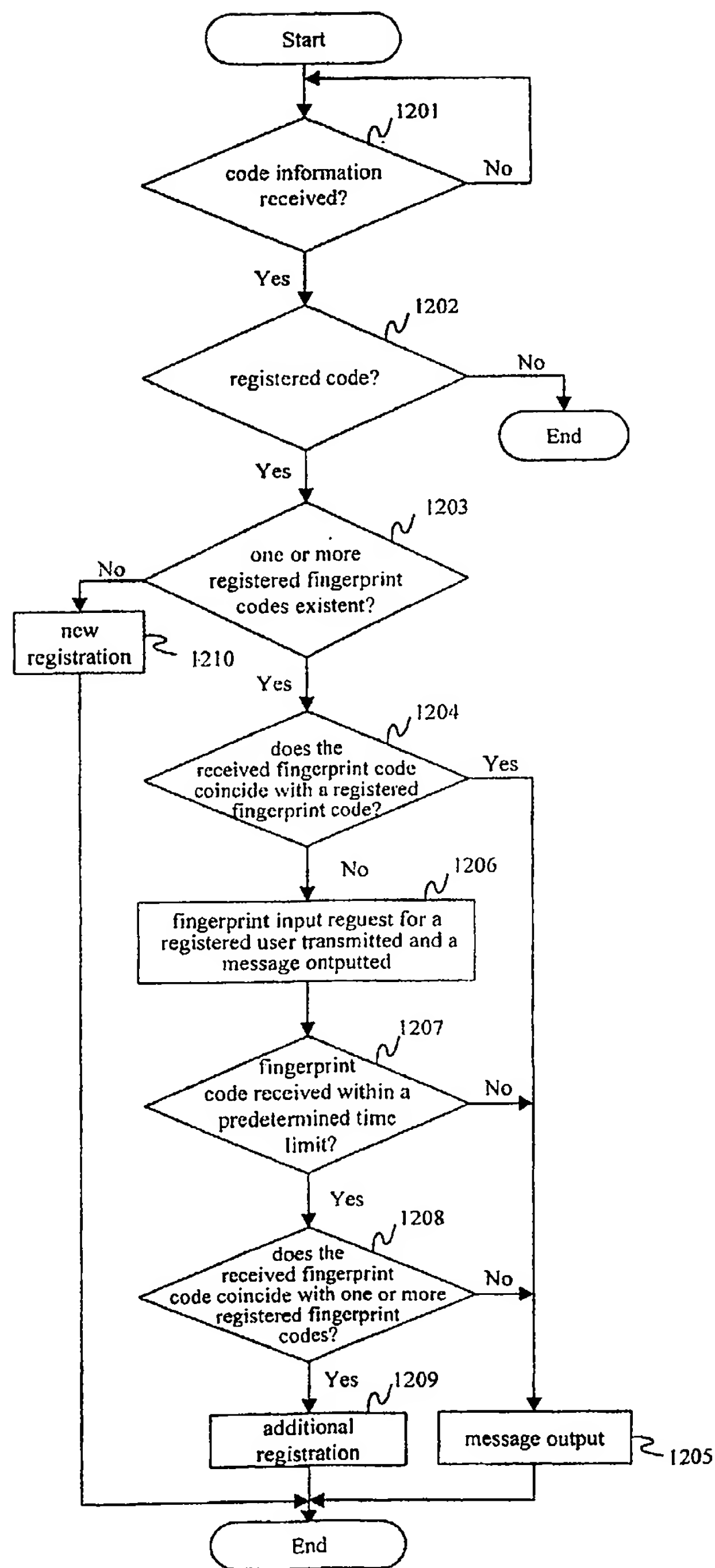
【Fig. 10】



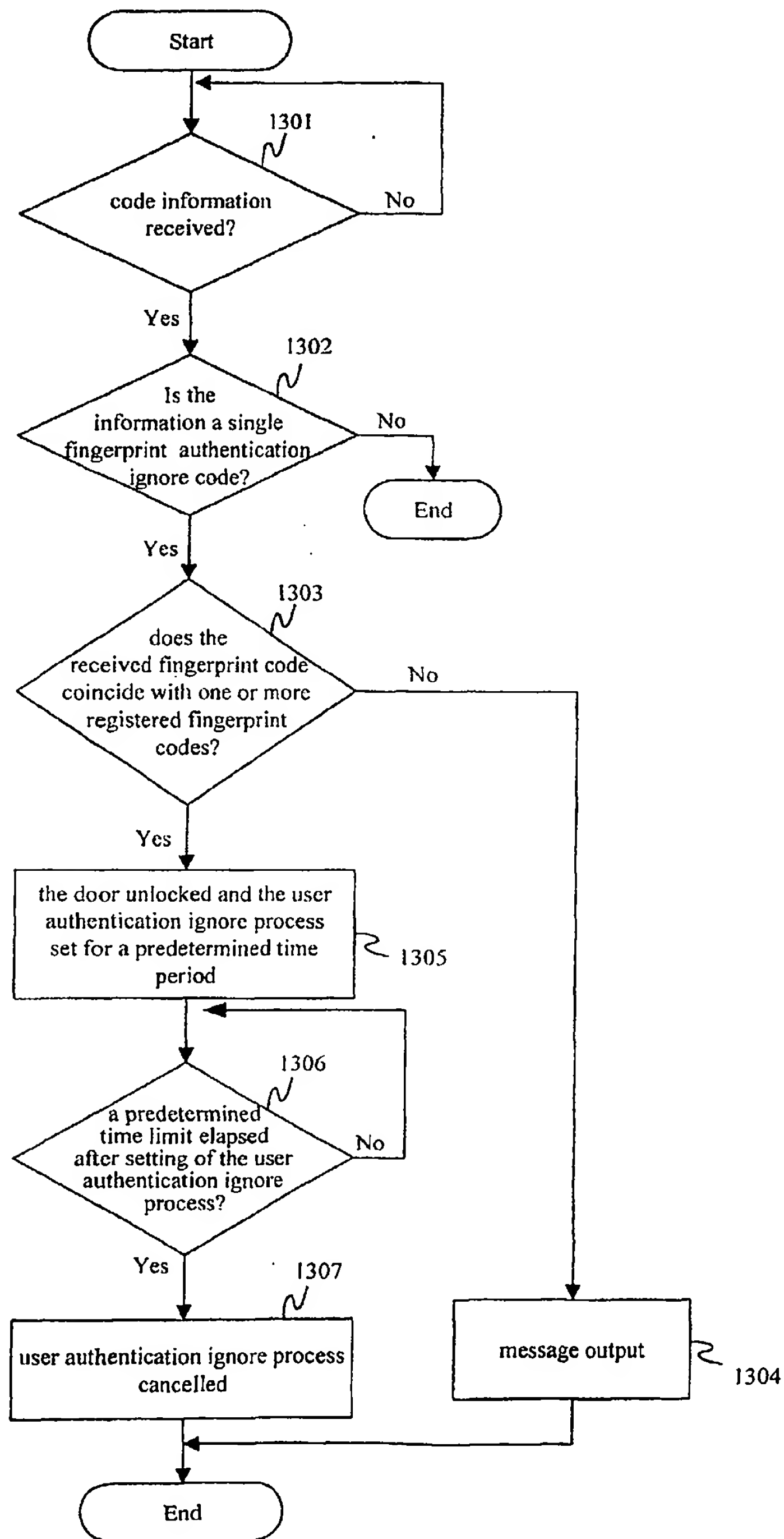
【Fig. 11】



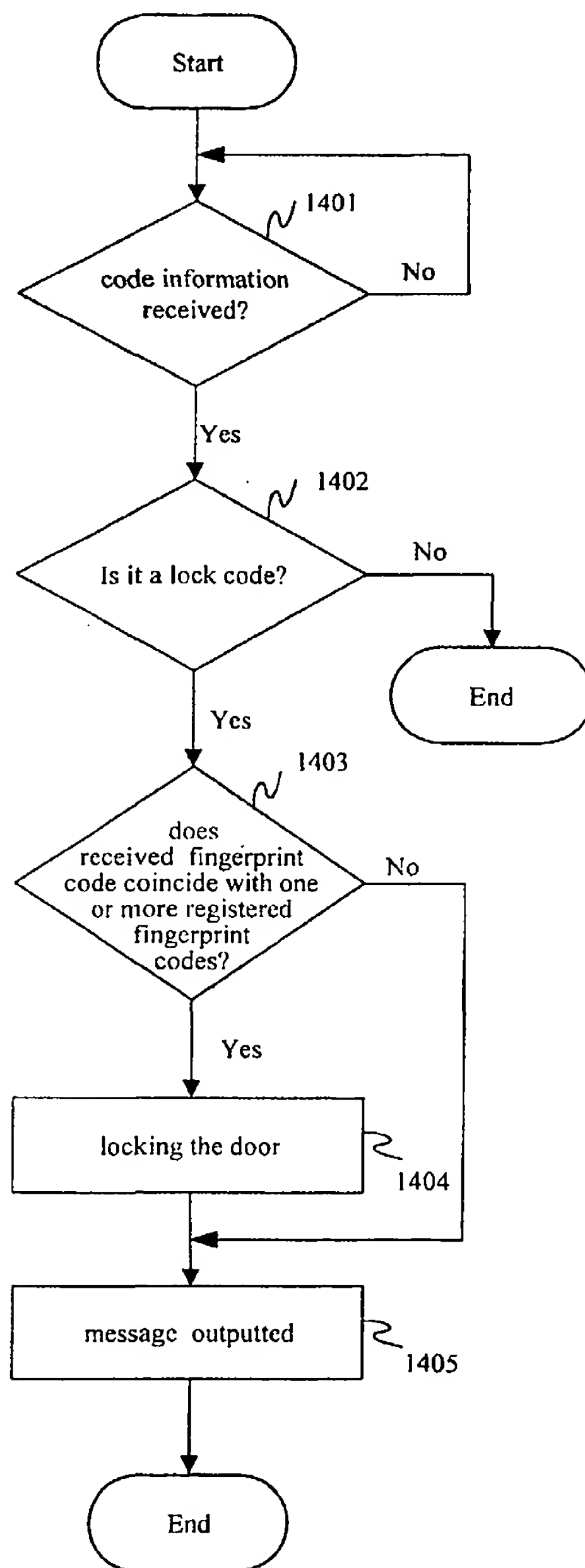
【Fig. 12】



【Fig. 13】

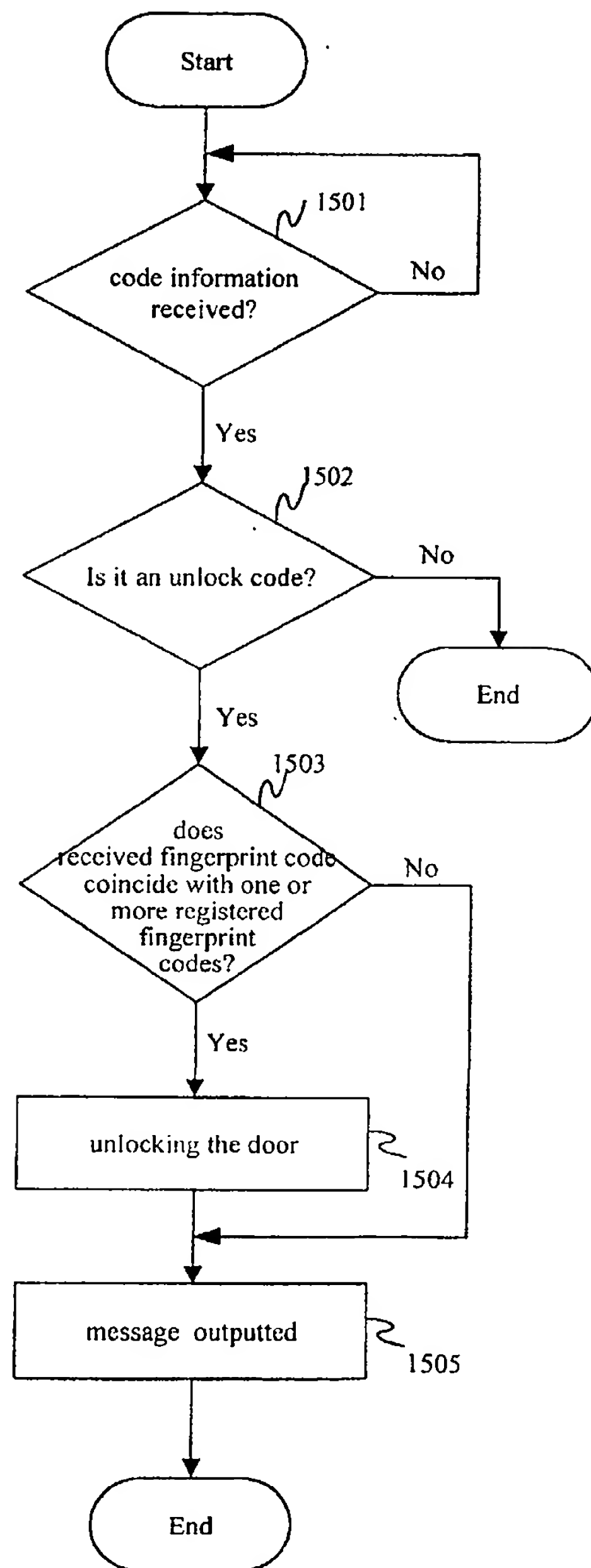


【Fig. 14】

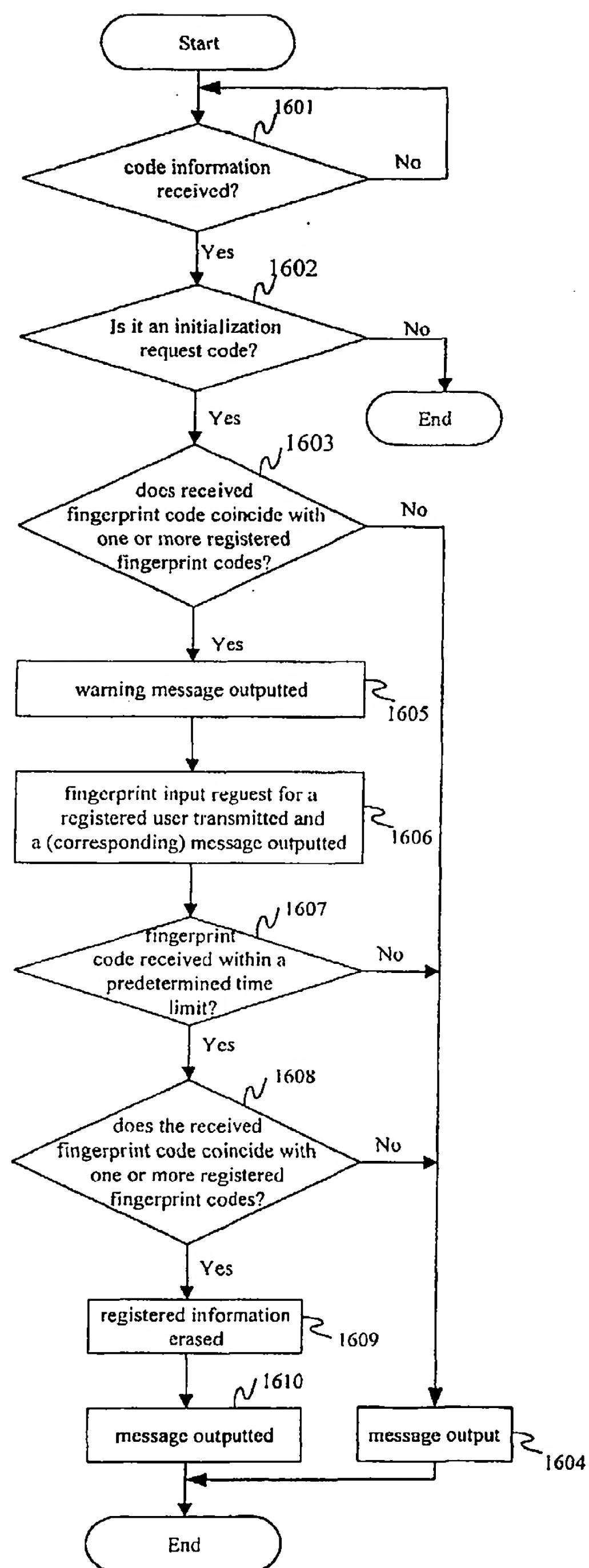




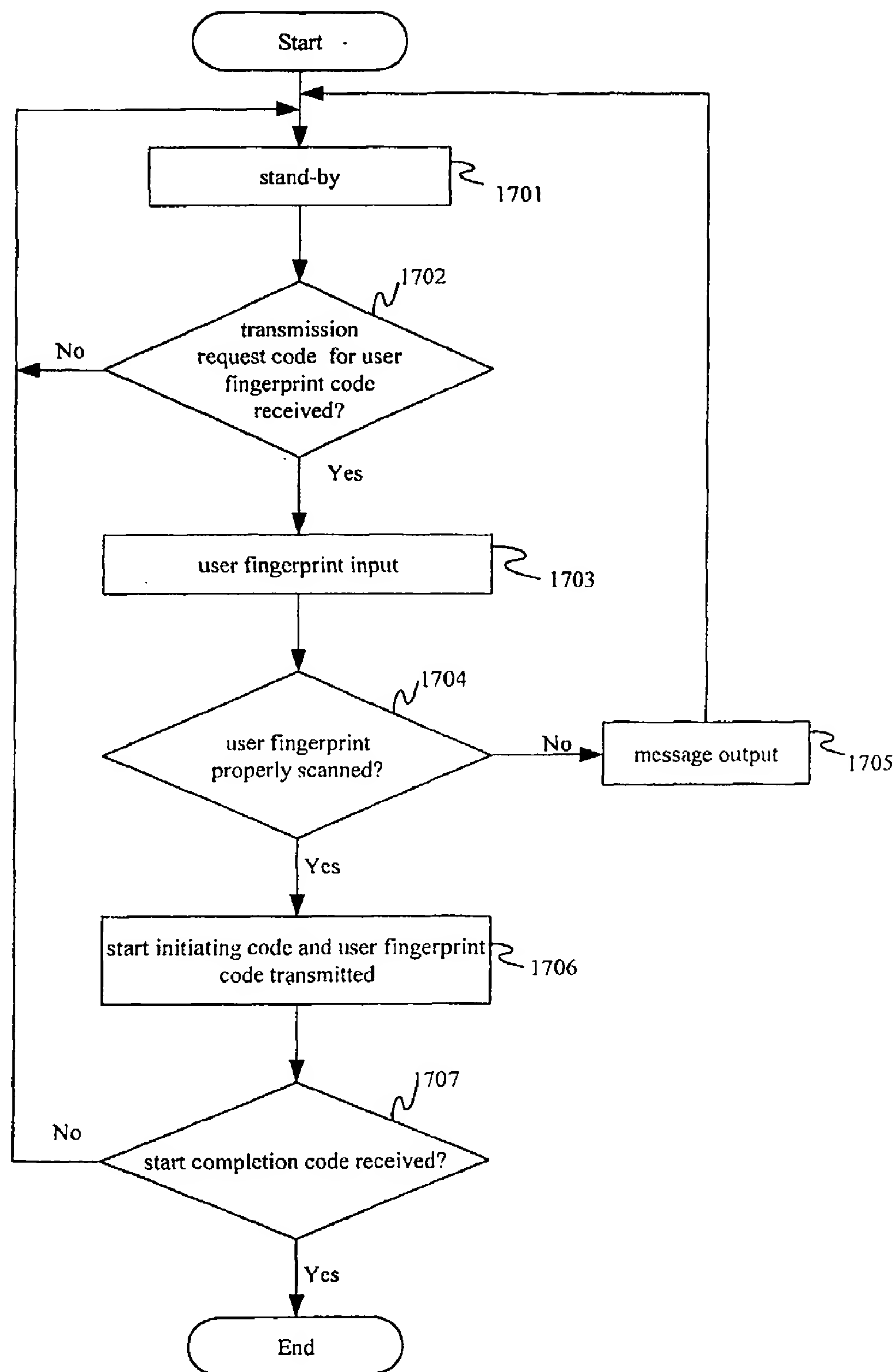
【Fig. 15】



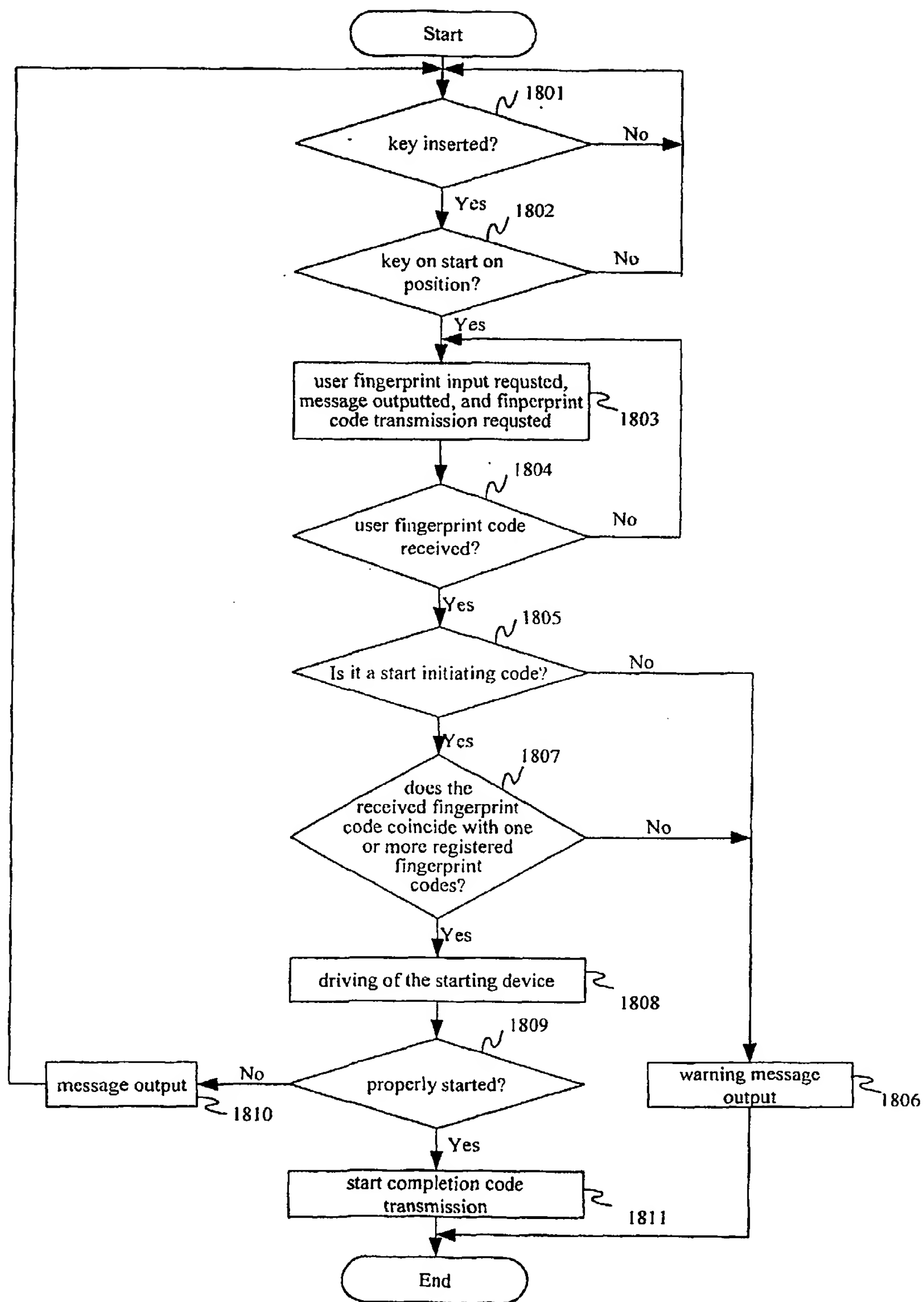
【Fig. 16】



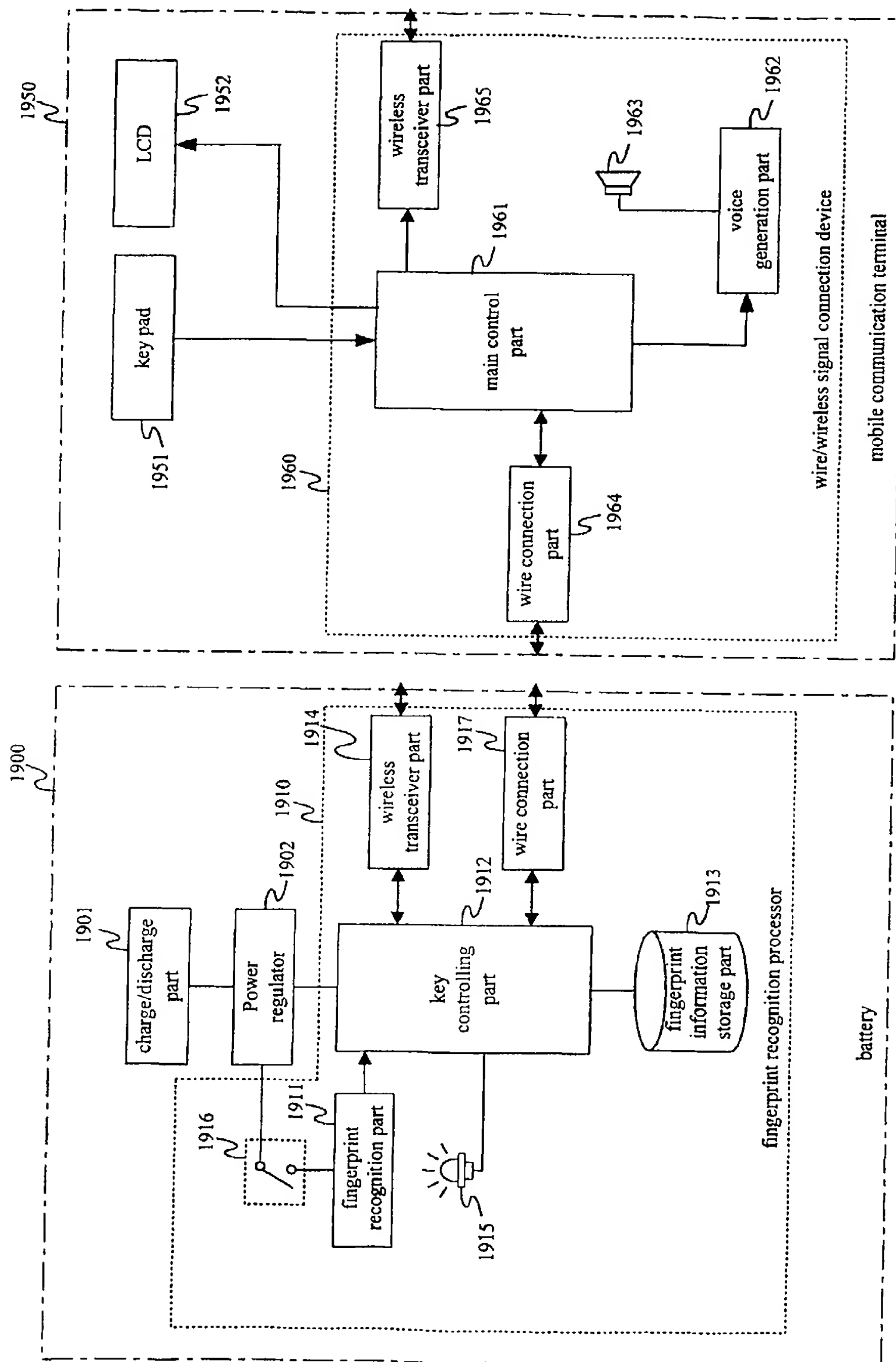
【Fig. 17】



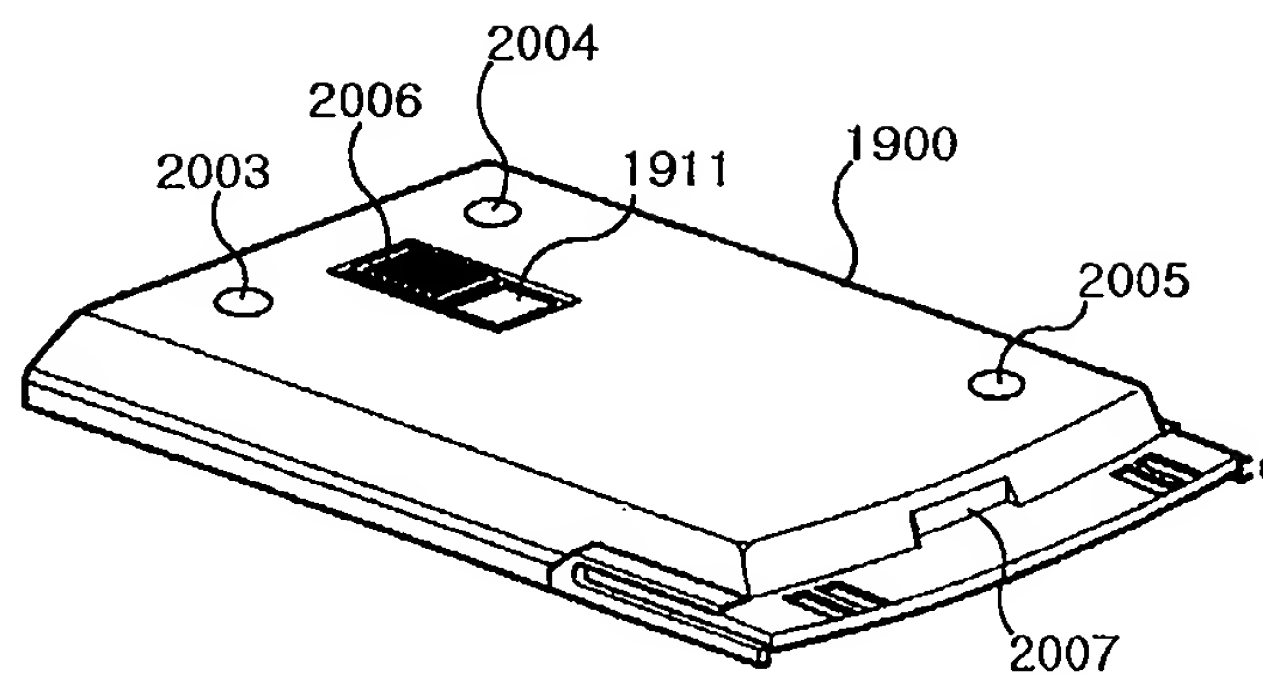
【Fig. 18】



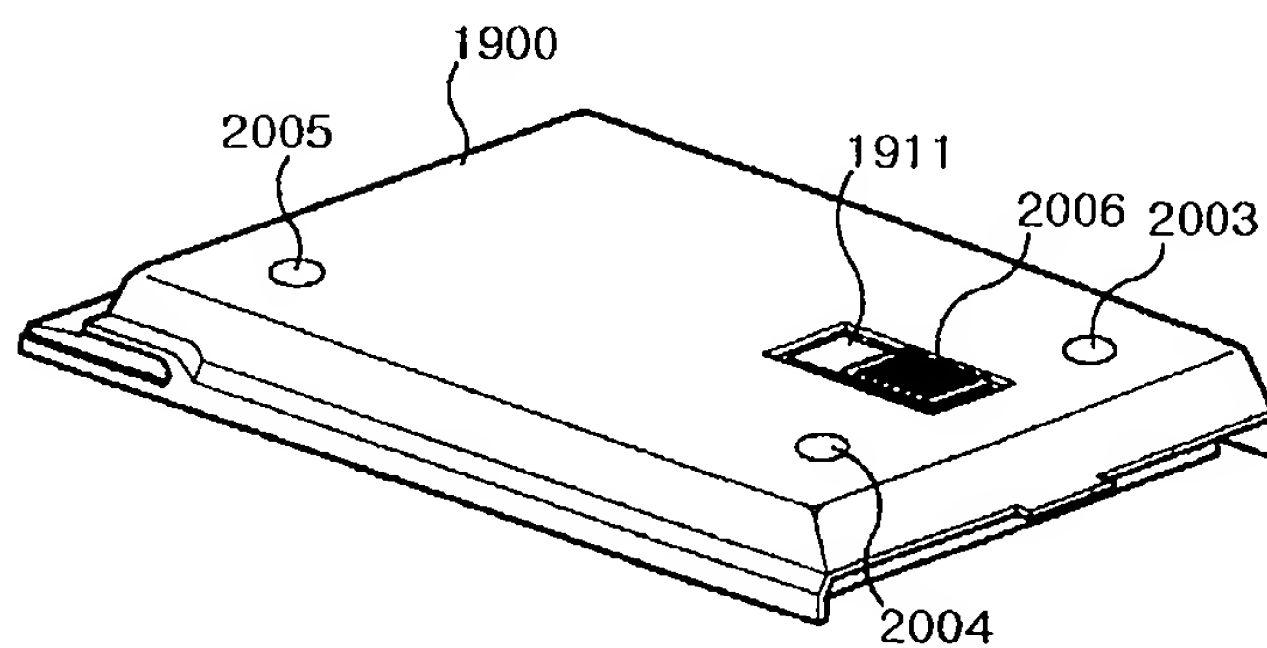
【Fig. 19】



【Fig. 20a】

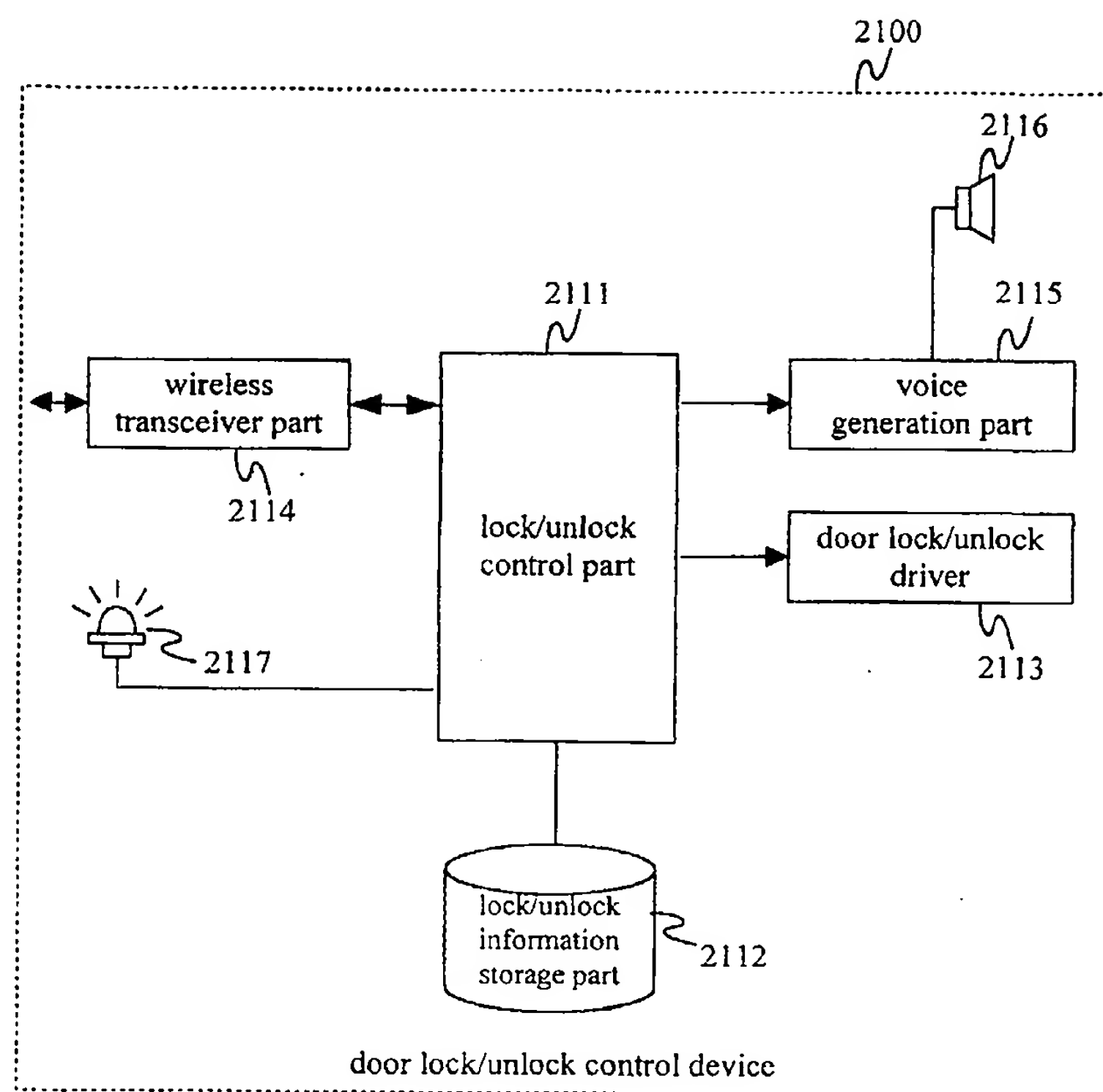


【Fig. 20b】

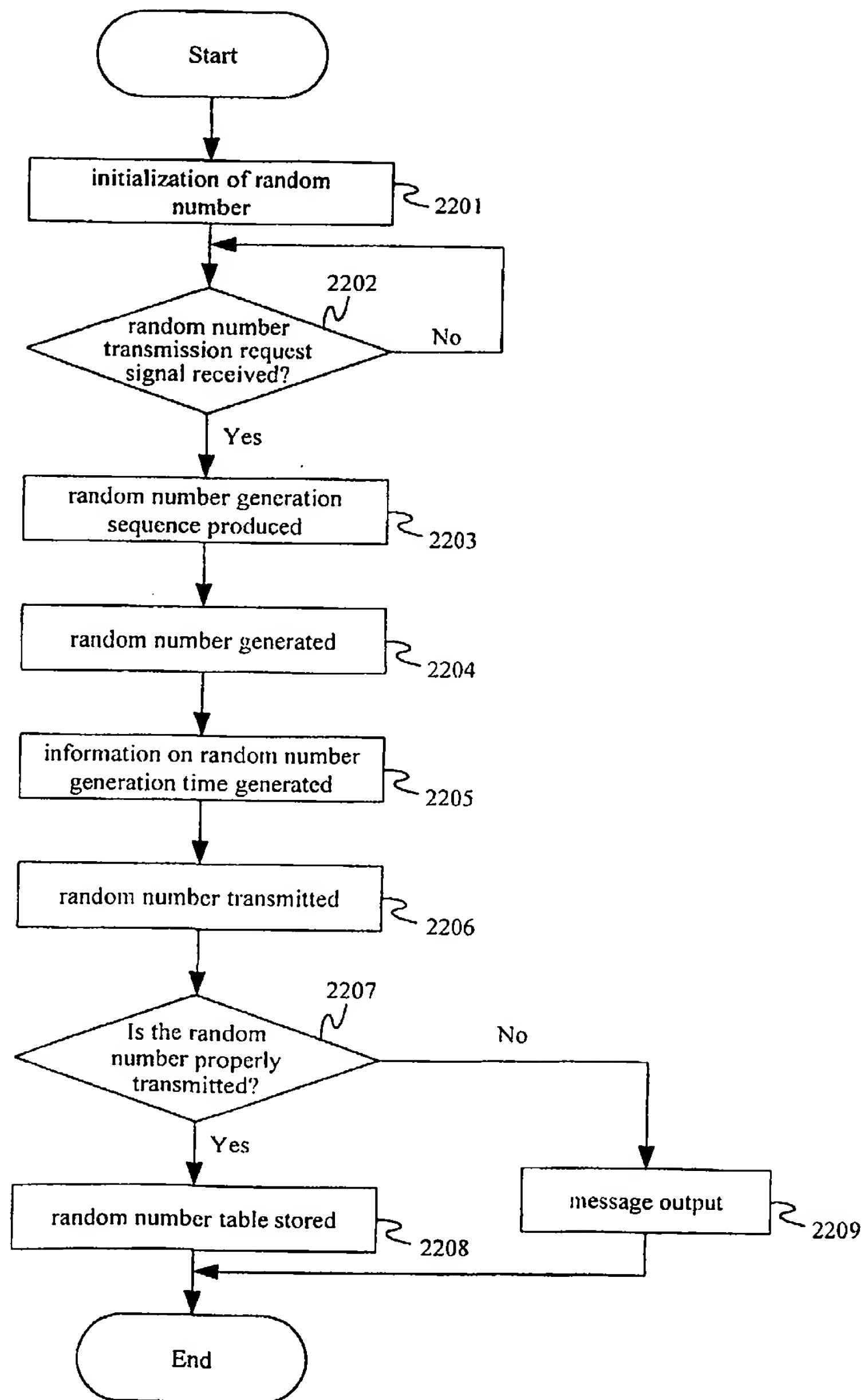




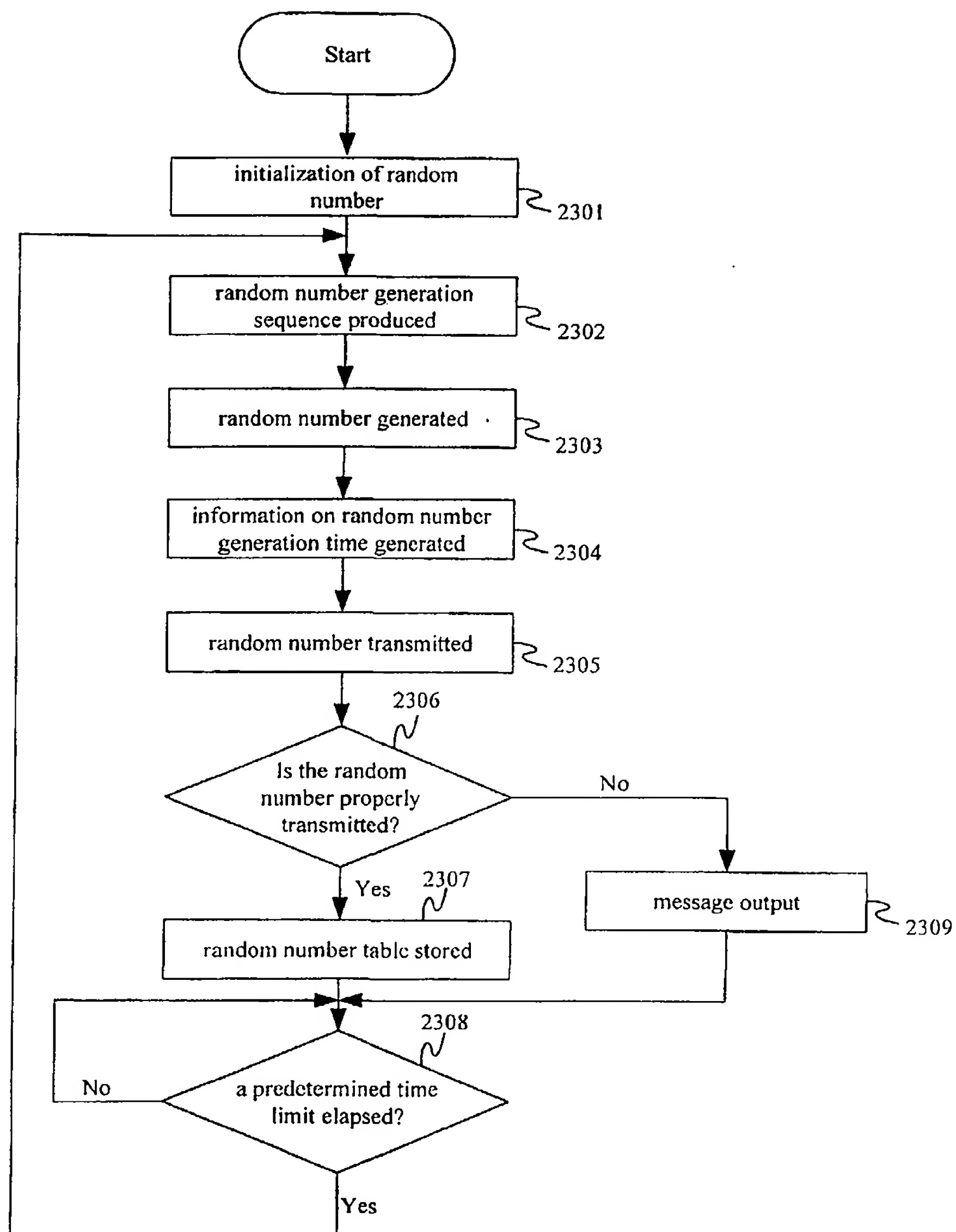
【Fig. 21】



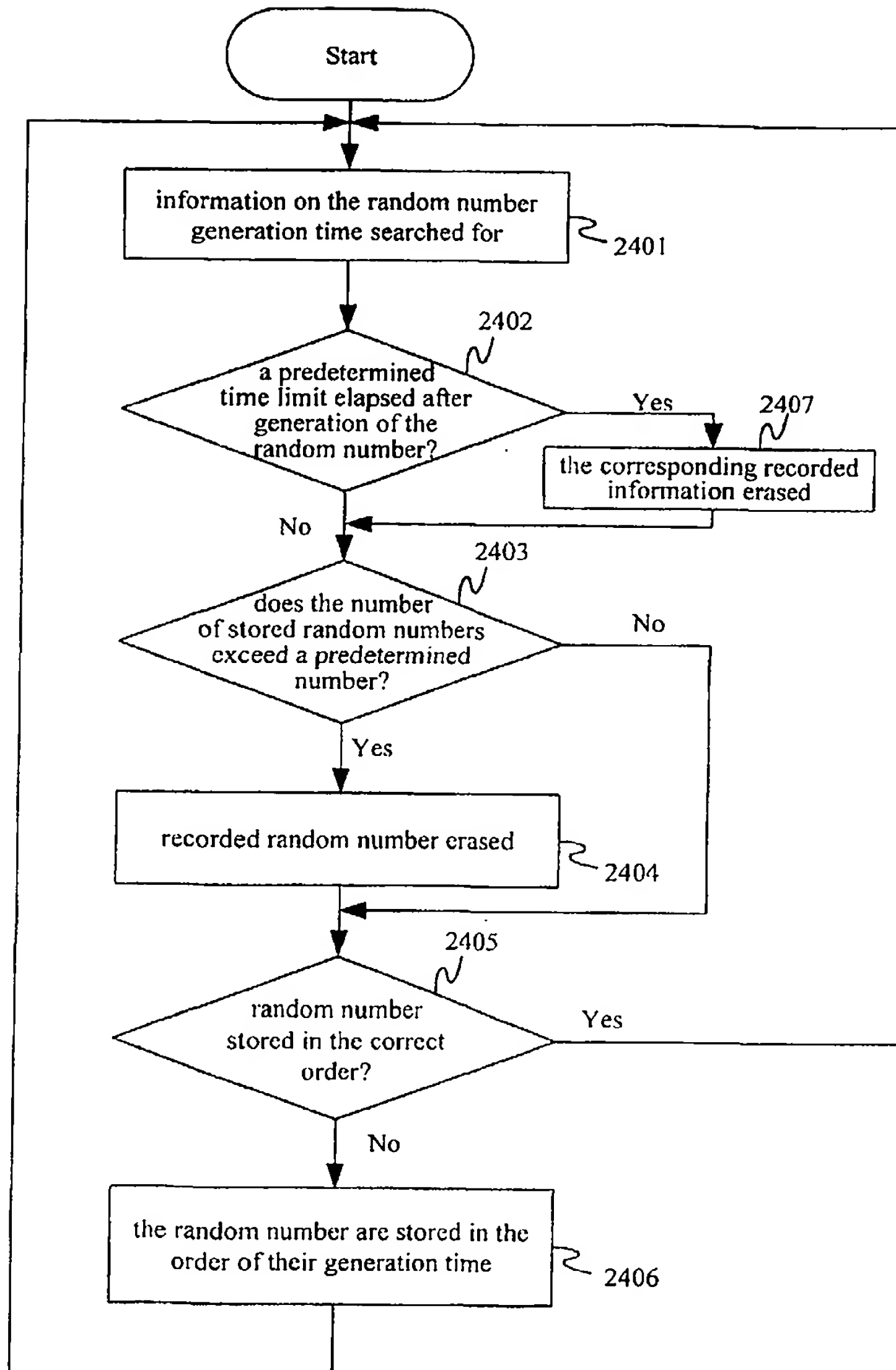
【Fig. 22】



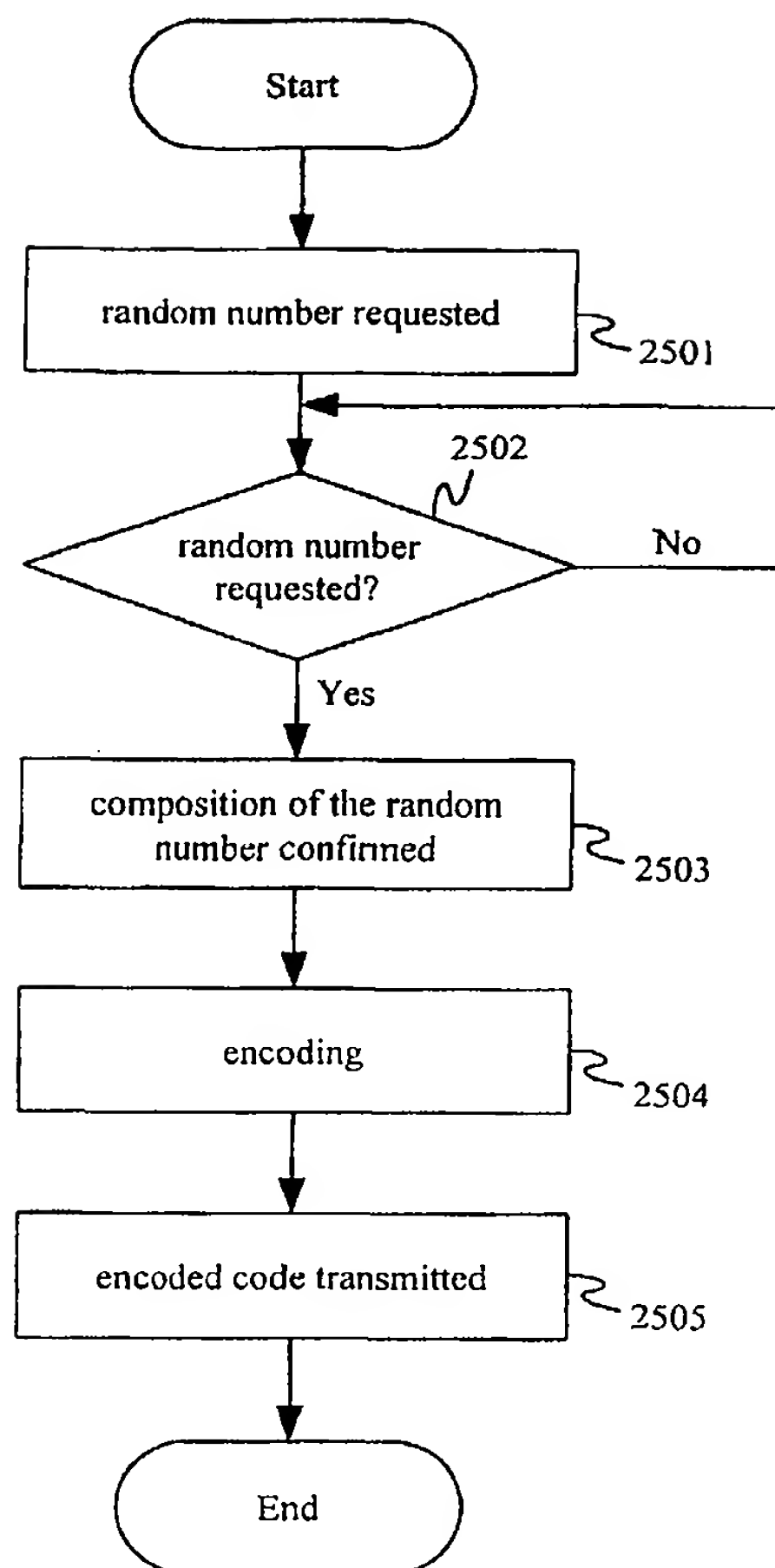
【Fig. 23】



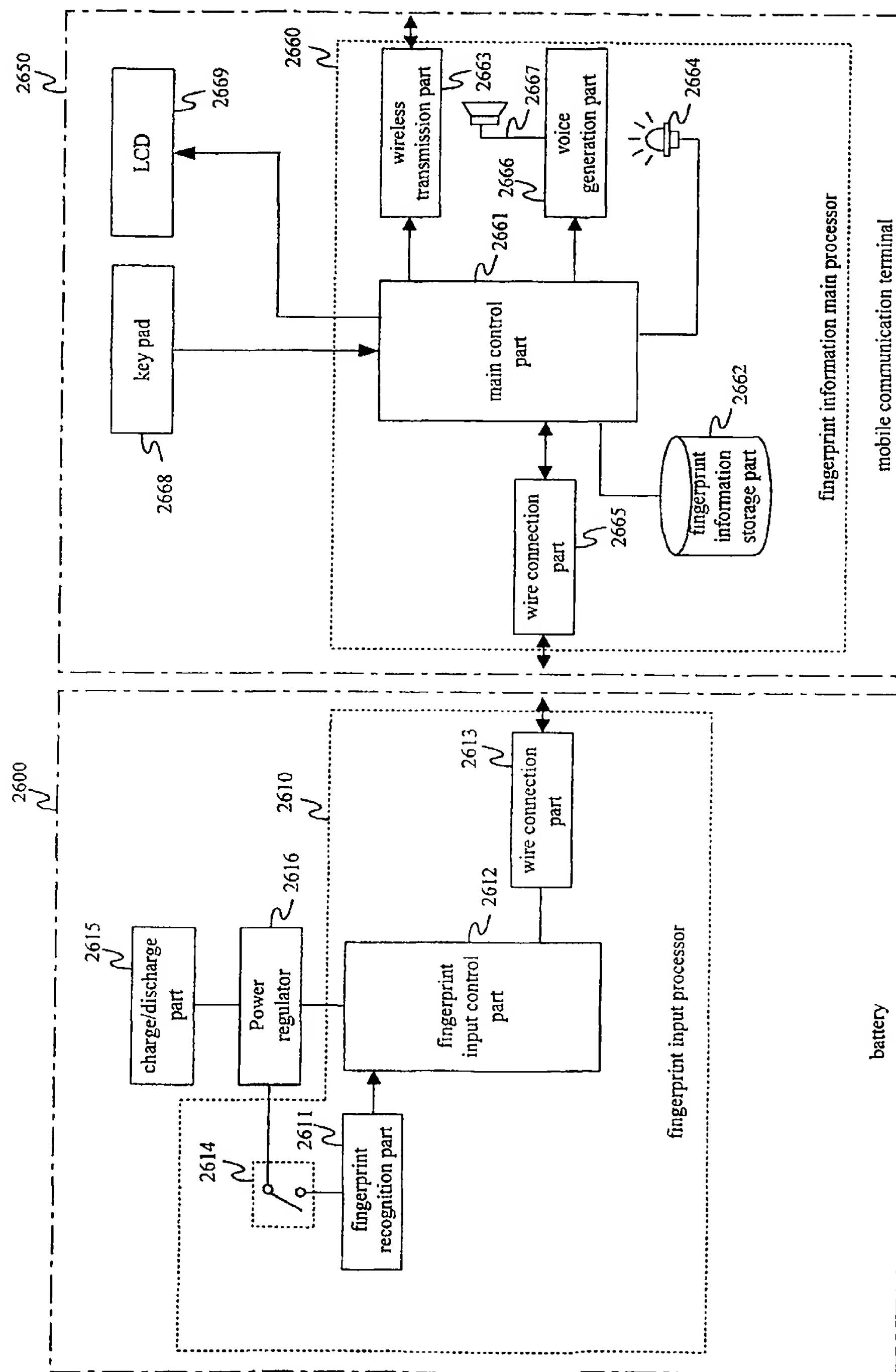
【Fig. 24】



【Fig. 25】



【Fig. 26】





# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/KR01/02167

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7 E05B 49/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B60R, E05B, H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

KOREAN PATENTS AND APPLICATIONS FOR INVENTIONS SINCE 1975

KOREAN UTILITY MODELS AND APPLICATIONS FOR UTILITY MODELS SINCE 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NPS

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP5-233896 A (MATSUSITA COMMUN. END CO., LTD) 10 SEP. 1993(10.09.1993) See the abstract, figure 1,3,4	1,2
P	WO01/68419 A1 (MITSUBISHI DENKI) 20 SEP. 2001(20.09.2001) See the abstract, figure 1	1, 4
P	JP2001-262887 A (MITSUBISHI DENKI) 26 SEP. 2001(26.09.2001) See the abstract, figure 2	1,4,10
A	KR2000-0072206 A (KOO, Hong Sik) 05 DEC.2000(05.12.2000) See the whole document	1,3,4,10,13
A	JP11-316818 A (TRW INCORPORATED) 16 NOV. 1999(16.11.1999) See the abstract, figure 1A, 1B	32,33,40
A	JP10-181533 A (MITSUBISHI DENKI) 7 JUL. 1998(07.07.1998) See the whole document	1,4,10,12,29,32,46

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:	"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

27 FEBRUARY 2002 (27.02.2002)

Date of mailing of the international search report

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